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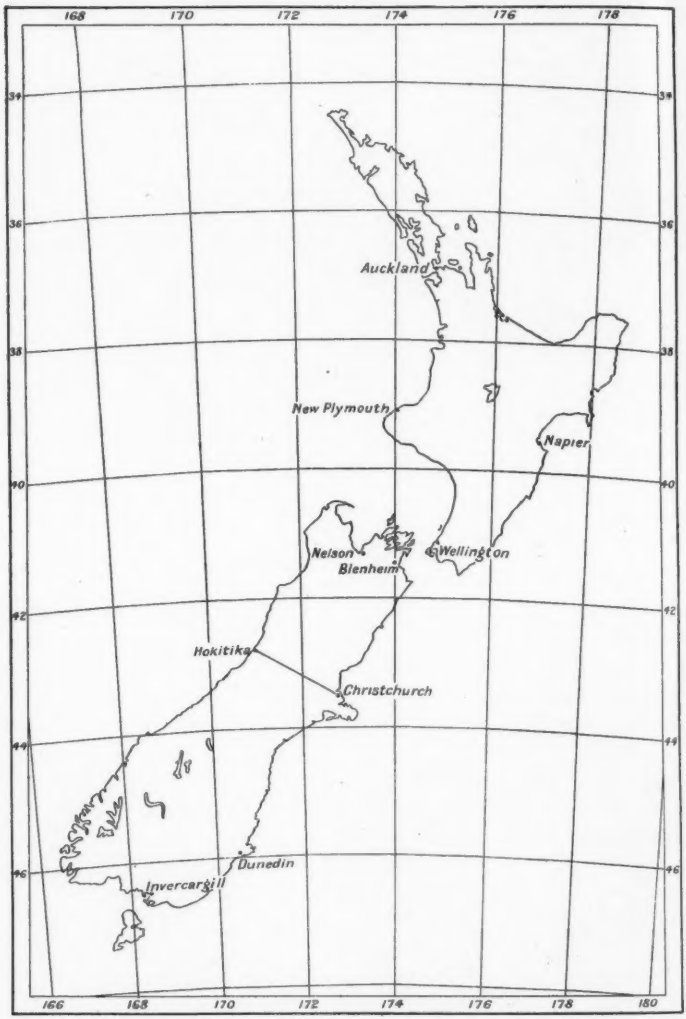
A PHYSIOGRAPHIC SECTION THROUGH THE MIDDLE ISLAND OF NEW ZEALAND.

The Middle Island of New Zealand, considering its relatively small size, presents a remarkably varied topography. A physiographic section from the city of Christchurch, capital of the province of Canterbury, to the town of Hokitika, capital of the province of Westland, exhibits many of the most interesting physical features. A line drawn from Christchurch to Hokitika is almost at right angles to both coasts of the Middle Island, and to the majestic Southern Alps, which form the backbone of the Island. Hokitika lies about 105 miles North 55′ West of Christchurch: in latitude 42° 43′ South: the latitude of Christchurch being 43° 33′ South.

On the western slope of the mountains, the main rivers—the Taramakau, the Arahura, and the Hokitika—flow to Tasman Sea in a general northwesterly direction, while, on the opposite slope, the Rakaia, with its tributary the Wilberforce, and the Waiamakariri have a general southeasterly flow to the Pacific Ocean. In other words, the main drainage channels are almost at right angles to the island-divide. The descent towards the west is much more rapid than towards the east, the distance from the ocean being on the one hand approximately 29 miles and on the other about 76 miles.

Looking from the summit of Mount Harman, which ascends some hundreds of feet above Browning's Pass, at the head-waters of the Arahura and of the Wilberforce, on a clear day one can see in the distance to the westward the broad expanse of the Tasman Sea, and to the eastward the mighty bosom of the Southern Pacific. Northeastward and south-westward runs the backbone of the Middle Island, the great mountain-chain of the Southern Alps. To the south-westward the chain can be seen gradually to increase in altitude, culminating in Mount Cook, a splendid monolith 12,349 feet

high. Close to Mount Cook are its mighty rivals Mount Tasman, Mount Haidinger, and Mount La Perouse, which are all over 10,000



OUTLINE MAP OF NEW ZEALAND.

feet in height. Around these mountains and partly covering them is the huge "mer de glace," in which rise the principal glaciers of

FIG. 1.—DISTANT VIEW OF MOUNT COOK, CANTERBURY, N. Z.

FIG. 2.—FOX GLACIER, WESTLAND, N. Z.

FIG. 3.—FRANZ JOSEF GLACIER, WESTLAND.

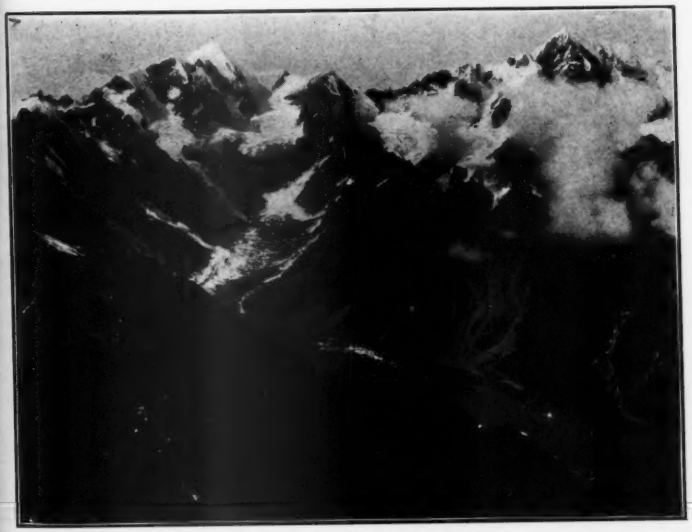


FIG. 4.—BALFOUR GLACIER, WESTLAND, N. Z.

New Zealand, flowing both to the Canterbury and the Westland sides of the Alps. North-eastward from Mount Harman the view discloses many lofty peaks, but, in general, there is a gradual diminution in height in this direction. Looking to the Canterbury side, one can see the mountains descend very abruptly at first, then more gradually for some miles, and finally disappear in the plains, at about 40 miles from the crest of the Alps. These plains, with remarkable evenness, continue to the seashore. The lower hills, lying just west of the plains, form the Foothills of the Alps. The wide, level stretch eastward to the sea is known as the Canterbury Plains. Towards the west the descent from the main crest of the Alps may be seen to be much steeper than on the eastern side, though at first it is less abrupt. On this side, also, parallel and branching ranges from the main ridge stand out less pronouncedly and are fewer in number than on the eastern side. Very little level land appears in Westland; but, bordering the sea, a narrow plain is visible, on which the town of Hokitika is situated. Towards the Alps this narrow plain is surmounted by many rounded hills, sometimes of sufficient altitude to be called mountains, which are outliers from the main ranges.

The fertile plains of Canterbury, almost devoid of timber, and easy of access, were settled in the early days of New Zealand colonization. The first settlement was made at Christchurch in 1848, and the settlers rapidly pushed westward, laying out farms and extensive sheep runs even on to the slopes of the Foothills. To-day the Canterbury Plains are dotted with splendid towns and villages and well-tilled farms. Roads run in every direction, and railroads connect the principal centres. For years after the settlement of New Zealand, Westland remained a wilderness. The dense forest which clothed the narrow plain did not tempt settlement from the sea-coast, and the Southern Alps formed an effective barrier from the east. It was only when alluvial gold-leads of astonishing richness were discovered near the mouth of the Hokitika River in 1865 that the first hardy pioneers found their way across the difficult mountain-passes and down the wild, rapid rivers to the Eldorado. Thousands of others came by sea. Mushroom towns grew up apace, and soon Hokitika had a population of nearly 20,000 people. All this transient glory has long since passed away, and Hokitika has faded into a broken-down town of some 2,000 inhabitants. Even yet there is comparatively little settlement on the West Coast, though the land is often rich, and it is only along the alluvial flats close to the principal rivers that one sees the scattered farms. The small com-

munity is an isolated one, the harbours on the sea-coast are poor, and there is only one main highway between the Canterbury Plains and the West Coast. This stage-road winds up the valley of the Waimakariri, and, crossing the Alps at Arthur's Pass, about ten miles north-east of Mount Harman, continues down along the broad valley of the Teremakau to the coast.

For years it has seemed to the Westland people that their dense forest has been the greatest drawback to their province, but in reality it is going to be one of their finest assets. Already timber is being exported. But it is not only in this direct way that the forest is to be of value. There is no doubt that the scenery of Westland is the most wonderful in New Zealand, and among the finest in the world, and the marvellous variety of the forest growth is its chief charm. It is this scenery which, by attracting thousands of tourists, will bring wealth to the West coast. The majestic *rimus, kahikateas,* and *totaras,* all giant conifers of magnificent shape; the beautiful dark-green, sweet-scented *rata;* covered with a moss of brilliant scarlet flowers for months in the year; the wonderful choice of ferns, from lacy filaments almost microscopic in size to huge tree-ferns towering 50 feet or more in height, with fronds even ten feet long; the stately cabbage-tree; the long-leafed nikau-palm; the innumerable pendent vines, creepers, and mosses; the brilliant Alpine flora—all these lend a fascination to the ever-changing forests of Westland which is quite lacking in the dreary, monotonous plains of Canterbury, and, owing to the marked difference of the flora of New Zealand from that of any other part of the world, give it a unique charm. The luxuriance of the vegetation is due to the mild, moist climate. The rainfall at Hokitika averages 120 inches a year; while it is only 25 inches at Christchurch, the lofty mountain-chain of the Alps precipitating the moisture brought by warm winds from the Tasman Sea, and thus preventing so large a rainfall on the Canterbury Plains. However, the actual number of rainy days at Hokitika is comparatively little more than at Christchurch, and no one can describe the brilliancy of the skies in Westland when the weather is fine; and weather of this sort, in which one can study the splendid sculpturing of the Alps, may last for weeks. The variety of the scenery is marvellous, and one is continually coming upon some new and charming feature—the deep gorges of the rivers; the innumerable splendid waterfalls, some of considerable volume, and many of tremendous height; the mountains with their tops capped with continual snow and ice; the great glaciers, stretching miles out from the mountains towards the sea: all these make

FIG. 5.—UNSER FRITZ FALL, NEAR FRANZ JOSEF GLACIER, WESTLAND.

FIG. 6.—WESTLAND COASTAL PLAIN, SHOWING GRANITE OUTLIER.

FIG. 7.—MOUNTAIN STREAM, WESTLAND.

FIG. 8.—WESTLAND CREEK, N. Z.

an indescribably beautiful landscape set off in a wealth of marvellous foliage. From beneath the shade of immense tree-ferns one can look up on the mountains with their continuous white mantle and down into a broad valley filled by a glacier. One rather remarkable feature about the mountains of the West Coast is the lowness to which the snow-line descends. The line of constant snow is only about 6,000 feet above sea-level in the latitude of Hokitika, though it is higher on the Canterbury side. Yet snow falls only very rarely at Hokitika, while nearly every year an inch or more descends at Christchurch.

The geology of the region is simple. The *massif* of the Alps and of the Foothills consists, in the main, of greatly-altered Paleozoic sediments, with lesser amounts of Mesozoic, and possibly very early Tertiary sediments, and with minor intrusions of eruptive rocks of varying petrographical composition. The outliers on the western side of the mountains are Mount Tuhua, Mount Turiwhate, and the Hohonu Mountains, the remnants of an ancient granite range. The wide coastal plains on the Canterbury side and the narrow bench on the Westland side of the Alps are underlain by late Tertiary rocks, of gradual inclination towards the sea on either side. These strata are covered on the Canterbury side by glacial débris, and by immense thicknesses of gravels, thinnest at the mountain edge and increasing in thickness towards the sea. Near Christchurch, Banks Peninsula forms a decided break in the even coast-line. It is an area of rocks of volcanic origin, with characteristic well-formed craters, and other evidences of comparatively recent activity, though the exact age is unknown. The narrow plain of Westland is also covered by morainic material of heterogeneous character, and by fluviatile and lacustrine gravels.

The edge of the plains on the Canterbury side is about 1,000 feet above the sea. The plains commence among the Alpine foothills, as wide river flats, which, on leaving the higher ground, widen into fan-shaped deltas. The deltas of the various streams unite at the edge of the hills to form the relatively vast stretches of the Canterbury Plains. The plains are of a fairly-rolling surface, and have a gradual but steady slope towards the east, down which the rivers rush in ever-changing courses. The descent of the rivers averages quite 30 feet per mile near the Alps, though it is not so great towards the sea. Gorges with falls and rapids occur where the rivers, often rising in glaciers, dash from the mountains to the plains. These falls do not occur at the actual borders of the old Paleozoic land, since the narrow river flats which mark the commencement of the

Canterbury Plains are closely bordered by the mountains, and represent merely the more rapid erosion by fluviatile or glacial action than by sub-aerial decay. Along the various rivers wide, terraced flats show the successive levels of the streams in wearing down their channels to grade. Floods are of common occurrence on the lower river flats, especially towards the sea, and some serious inundations have destroyed great numbers of cattle and removed bodily many acres of very arable land.

On the Westland side the inner edge of the plain is also about 1,000 feet above sea-level, and hence its inclination to the sea is much more than that of the Canterbury Plains. The plain has been deeply scored by the glaciers which formerly flowed westward from the Alps; and though many of the glacial valleys were filled by morainic débris, the tremendous scouring of the many rivers is already rapidly wearing away the former plain, producing a new baselevel, above which the remnants of the former plain stand out with prominent relief. Still higher are the granite outliers of the old land, which were islands off the coast during the laying down of the late Tertiary sediments. Some of the larger streams, like the Teremakau, the Hokitika, and the Arahura, have wide stretches of river flats towards the sea. At the junction of the Hokitika and its two large tributaries—the Kokatahi and the Styx—the flat is approximately 10 miles across, and this towards the sea unites with the new coastal bench, several miles wide. Many relatively recent alterations in the drainage channels are very evident, though some of the rivers occupy ancient valleys. The Upper Teremakau probably flowed at some remote period east of the ancient granite range into the Arahura; later it flowed north by Lake Brunner. Its present channel is probably of recent formation, and thus the valley of the large and powerful Teremakau, though followed by a glacier in glacial times, is still comparatively narrow between the Turiwhate Range and the Hohonu Range. A small river known as the Orangipuku, which flows into Lake Brunner from the south, runs along the former channel of the Teremakau, and in one part of its course flows within 300 yards of the larger river, and practically on the same level. In addition, immense springs bubble up through the bouldery banks, along the Orangipuku, and their water evidently comes from the Teremakau, as the quantity which they put forth depends directly upon the amount of water in the Teremakau.

The lakes of Westland are very interesting, and show strikingly

FIG. 9.—LAKE KANIERI, WESTLAND, N. Z.

FIG. 10.—SOUTHERN ALPS, WESTLAND, SHOWING A MORAINE ON THE ICE, A VERY RARE FEATURE ON THE WESTLAND SIDE.

FIG. 11.—LAGOON, SOUTH WESTLAND, N. Z.

FIG. 12.—SOUTHERN ALPS, WESTLAND, N. Z.

the pronounced influence of glaciation. Lake Kanieri is a beautiful sheet of water, with rough, rocky shores, bordered by a thick luxuriant foliage. The beauty of the lake is enhanced by the dark green of wooded hills, some thousands of feet in height, which immediately surround it, and by the magnificent snow-clad peaks of the Alps, which rise in stately splendour in the background. The basin of Lake Kanieri occupies an ancient river valley. During the period of maximum glaciation a glacier descended the Styx River and sought a passage northward through the valley now occupied by Lake Kanieri. Glaciers also flowed from the hills on the east and west of the lake. The effect of the union of the several glaciers has been the formation of a very deep trough, with a relatively even and almost level bottom. Soundings recently made by Mr. P. G. Morgan, of the Geological Survey of New Zealand, show that the greatest depth of the lake is 646 feet. As the surface of Kanieri Lake is some 422 feet above sea-level, the bottom is 224 feet below the surface of the ocean. The water of Lake Kanieri is dammed back by an immense terminal moraine at its northern end. Formerly this moraine turned the drainage in the opposite direction from that of the preglacial river, and the water sought exit by a channel flowing up the old valley into the present valley of the Styx. Then there came an immense slip from mountains to the east, which closed the passage to the Styx, and the lake sought exit over the lowest part of the moraine, or practically along the old Styx River valley. A lake of very similar origin to Lake Kanieri is Lake Coleridge in Canterbury, which drains to the Wilberforce. The lake occupies an ancient glacial valley, with its long axis parallel to the course of the Rakaia.

Lake Ellesmere on the Canterbury coast is quite different in origin from Lake Kanieri and Lake Coleridge. It is practically a shallow lagoon dammed off from the sea by a broad sand-bank. The lake was formerly a bay bordered on the north and north-east by Banks Peninsula, and the bank across its mouth has been produced by the sweep of the northward current which flows along the coast. The Totara Lagoon on the Westland coast is of similar origin, and Lake Mahinapua, which in time of flood receives the waters of the Hokitika River, is also to some extent the result of a current sweeping along the west coast, though in part it is dammed by morainic material. It is relatively a shallow lake, of dark-brown swampy water, of great scenic interest owing to the magnificent forest growth which surrounds it.

Browning's Pass is a broad U-shaped elevated trough, bordered by the rugged slopes of Mount Harman on the north and by the precipitous cliffs of Mount Hall on the south. Both are capped with perpetual snow, and from Mount Hall the Hall Glacier descends over an ice-fall into the huge cirque in which rises one of the tributaries of the Wilberforce River. Other tributary streams flow with steep falls from the slopes of Mount Harman into the cirque basin, which is some 1,600 feet below the level of Browning's Pass, or about 3,000 feet above sea-level.

Lake Browning on the summit of Browning's Pass, a somewhat shallow depression, a quarter of a mile in diameter, now forms the headwaters of the Arahura River, though it formerly drained over the lip of the pass into the Wilberforce. On the Arahura side, below Browning's Pass, is another great cirque, in which the Arahura receives several small tributaries, with steep, high falls from the surrounding mountains. One of its most interesting features is the low ridge, which borders it to the west, and through which the Arahura has cut a narrow gorge. Standing on the mountains on either side, one can easily trace the broad U-shaped valley on its course towards the sea, in which the narrow V-shaped valley is being incised.

Owing to the enormous rainfall on the West Coast, denudation is rapid. Immense rock-slides from the mountain sides continually descend into the rivers, and huge talus fans are rapidly filling up even the deepest lakes. The scenery of the Upper Arahura is magnificent in the extreme. From the summit of Styx Saddle, a grassy pass which leads from the Arahura to the Styx, one can look down on the broad, ancient glacial valley, wooded—the timber gradually disappearing upward and lost in scraggy ratas, mountain cabbage-trees, etc.—then above the snowgrass, and still higher the mantle of snow, from which protrude the dark-colored jagged *nunataks*. Away up the valley of the Arahura are the lofty giants of Mount Harman and Mount Hall, the jagged peaks covered with snow, and with here and there a flat, free from protruding rocks, indicating a small glacier. Down the valley one can see numerous falls leap hundreds of feet from wild, unexplored valleys, in magnificent cascades, into the main river.

Many years ago the Maori chiefs crossed the Alps at Browning's Pass, and descended their sacred river, the Arahura, in search of the precious greenstone (nephrite), from which their ornaments and war axes were made. Recently the discovery of auriferous quartz veins, on the western slopes of Mount Harman, has necessitated the construction of a rough mountain trail by the European inhabitants

of New Zealand, over the same route followed so many generations ago by the Maori warriors.

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Wellington, 30th September, 1905.

MAPS OF MEXICO.

BY

F. J. H. MERRILL.

The person who, through scientific or commercial interest, seeks accurate cartographic information about Mexico,—or, indeed, accurate information about Mexican maps—meets with many difficulties. Libraries, as a rule, do not consider it important to keep in touch with the progress of maps and map-making; book-sellers handle only those maps which are made known by advertising and yield a liberal profit in handling, and commercial map-publishers can make a large profit from an untrained public by putting new dates on old map-plates. The inquirer, therefore, after wasting some time, ascertains that the preparation and publication of accurate maps has become a branch of Government work in Mexico, as in many other countries, and that information must be obtained from the Government Bureau in charge.

Our sister Republic, with its enormous extent of unsettled territory, is pushing to completion, as rapidly as possible, its topographic survey, which has been in progress more than twenty years, and will, in time, result in covering its territory with a series of sheets on the scale of 1:100,000, each including about 15′ of latitude and about 30′ of longitude.

As these will be, for a long time to come, the only accurate maps for the use of the public, a brief description will be of interest. The official key map shows the following divisions and prospective series: A. Nine sheets on the scale of 1:2,000,000, designated by large Arabic numerals. B. Twenty-four sheets on the scale 1:1,000,000, designated by small Arabic numerals from 1 to 24, beginning at the N. W. corner. C. Ninety-six sheets on the scale of 1:500,000, each of the sheets of series B being divided into four equal parts, designated by Roman numerals from I to IV. Of this

series, about 20 sheets fall outside the boundaries of the Republic. D. Each sheet of series C is divided into 25 quadrangles on the scale of 1:100,000, designated by letters, and this base, with 50 meter contours, is the present base of general publication. On this scale 10 mm. = 1 kilometer or 1 mile = .633 inch.

The sheets measure 40 cm. x 53 cm., and are of uniform size for all the different scales. They are laid out in an arbitrary system of distribution, without especial reference to latitude or longitude, but with one sheet centring on the City of Mexico. The meridian of the east tower of the cathedral of the City of Mexico, which is 6 h., 36 m., 21.05 sec. West of Greenwich or in longitude 99° 5′ 15″ W., is the prime meridian of the Republic, and forms the centre line of one column of these sheets, so that east and west of the Mexico City sheet, known in the series as 19. I. M., the adjoining sheets begin approximately at long. 0° 15′ E. and 0° 15′ W., terminating approximately at long. 0° 45′ E., 0° 45′ W. respectively, including a rectangle 24.8 m. by 34.7 m. with an area of 860.6 sq. miles.

These maps are published and sold by the Seccion de Cartografía of the Ministerio de Fomento, in the City of Mexico, the price being 70 cts. Mexican per sheet. Up to January, 1906, 128 sheets had been issued, covering different parts of the Republic. Eleven of them are in Sonora, the others are mainly in a zone lying toward the Gulf of Mexico and extending from the Rio Grande to the Isthmus of Tehuantepec. They are well engraved and printed in three colours —culture in black, drainage in blue, and contours in brown. Their chief fault is the very large contour interval, 164 ft. For the mountain districts this is fairly satisfactory, but, in a relatively level country, it falls far short of meeting the public needs. It is also to be regretted that none of the contours are numbered as to altitude, and, further, that scales of English miles and Spanish leguas are not shown on these sheets; for they are used by many English-speaking people, who always estimate distance in miles, while the average native Mexican has no other measure of distance than the legua or league.

A matter of serious importance regarding the Mexican topographic sheets is the difficulty of obtaining information concerning them. The only New York library open to the public possessing a set is that of the American Geographical Society, and this was acquired by purchase. In the library of the U. S. Geological Survey are but 38 of the 128 sheets said to be issued. Few of the people who need to use them have ever heard of them, and lists of

the maps already published cannot be had without writing to the office of publication.

With the growing investment of American capital in Mexico, and the increasing need for these maps by people who do not live there, it would seem that the Mexican Government should recognize the importance of placing sets of them in public libraries in the principal American cities, with full information concerning them. In this way the double purpose would be served of enabling many who need these maps to obtain them and of greatly increasing their sale. It is manifest to all who are familiar with commercial conditions in Mexico that these valuable sheets will not fulfil their utmost measure of usefulness if their sale is restricted to those persons who live near the City of Mexico. At Hermosillo, the capital of Sonora, the writer found it impracticable to obtain copies of these maps, although eleven sheets had been surveyed in Sonora and published.

Pending the completion of this topographic survey, a person requiring a map is much in need of general compilations of existing information. The Secretaría de Fomento issues from time to time editions of a general map of the Republic on the scale of 1 :2,000,000, or 31.6 m = 1 in., which probably express the best available information. One of these was issued in 1890 in the name of General Carlos Pacheco. It was engraved in Paris by Erhard Bros., showing surface configuration by hachures in brown, and is a very handsome map. A second was published in 1894 in the name of Manuel Fernandez Leal, compiled by Engineer I. Molina, and a third in 1899 under the same authorship. The last bears the imprint of LeCocq, Paris, and shows topography in a brown tint. It is a great advance over any previous issue, and is probably the best existing general map of Mexico. It has the specially good feature of showing in red all points located by their co-ordinates of latitude and longitude. It would appear from this that almost no work has been done in astronomical survey of the State boundaries, and therefore, their locations are, in most cases, probably not exact.

A point in which all Mexican maps which have come to the writer's notice seem to fail is in the accurate location of the mining camps, this being specially true of the topographic sheets. At the present time, when the development of many parts of the Republic is so largely dependent on the encouragement of the mining industry, it would appear that to locate these mines, or groups of mines, were a matter of urgent necessity. Surely the position of a mining camp producing thousands of dollars monthly is more important commercially than the location of some little village where

practically no business is transacted, and of which the male inhabitants have no other means of livelihood than working in the mines a few miles distant. Yet this distinction is everywhere made.

No American maps of Mexico are wholly satisfactory. Probably the best is that compiled by M. Hendges and issued in 1900 by the Bureau of the American Republics at Washington, D. C. This shows with some accuracy the location of a considerable number of mining camps, in many cases indicating the character of their mineral product. Its scale is 1:3,168,000, or 50 miles to 1 inch, and its size is very convenient for a general map; but its usefulness is much impaired by a brown lithographic tint intended to show topographic relief. The purpose aimed at is not attained with any degree of accuracy, and legibility is much obscured by a lithographic error which has been made in printing the brown topography over the black culture and drainage, instead of the black over the brown, while the cost of manufacture is increased by an extra color. The details of drainage on this map differ considerably from those of the Leal map of 1899. It also makes the error of stating that the meridian of Mexico City is 99° 11′ 36″ W. of Greenwich, instead of 99° 05′ 15″. If the Hendges map were brought up to date and printed without the brown topographic tint it would be most satisfactory.

The other best-known American map is that of Rand & McNally. While of convenient size, on the scale of 72 m. = 1 inch, the base is obscured by an attempt to show mountain relief in black hachures, which interfere much with the legibility of the names and cannot by any possibility be correct. The interference is more evident on the folded maps, which are printed on uncoated paper, than in the atlases, which are on coated paper. This map without hachures would be much more valuable.

The experience of years of map-making by the best engravers of the world has established the fact that to show topography accurately by hachures involves not only accurate information, but very careful and expensive engraving. The work of the British Ordnance Survey and of our own Coast and Geodetic Survey is of the highest order in this respect. Where information is uncertain and economy is an object, attempts to show topography were better suppressed and the details of the map confined to drainage, the location of points of importance, and of lines of transportation, such as railroads, wagon roads, mule paths and canals. It should always be borne in mind that the frequent attempts to show topography by hachures in commercial maps are generally inaccurate and misleading.

The most perfect small-scale map of Mexico, showing by hachures the general features of its relief, is in Stieler's Handatlas, edition of 1904. The scale is 1:7,500,000, or about 118 m. to 1 inch; and as it can be bought separately at 20 cents a copy, it should be in the possession of every one interested in the topography of Mexico. Another topographic map of much interest is contained in a work entitled Le Mexique au Début du XXème Siècle, published by Ch. Delagrave, Paris, 1904. It is on the scale of 1:5,000,000, and shows relief in contours with an interval of 500 to 1,000 meters and with the successive zones in different shades of colour. This work contains, also, a small mineral map on the scale of 1:10,000,000, by A. de Launay, aiming to show by coloured conventions the location of the various mineral deposits. Its small scale, however, interferes somewhat with its usefulness.

Fairly accurate large-scale maps of the Mexican States are contained in an atlas compiled and published by Sr. Antonio García Cubas, Mexico, 1884. This work gives also a list of the mining camps in each State and considerable information concerning mineral resources.

There are probably numerous other maps of the various States, but only a few are known to the writer. A good map of Sonora is issued by C. E. Herbert, Nogales, Arizona; but does not include the results of the topographic survey.

Since the beginning of the present year, a new Map of Sonora and Baja California, on the scale 1:750,000 or about 12 miles to the inch, has been issued by Mr. Max Bohmer of Hermosillo. This Map has been compiled with much care and includes the data as to culture and drainage contained in the topographic sheets surveyed by the Mexican Government in Sonora. The boundaries of the various districts are shown with much greater accuracy than in any previous map, and considerable pains have been taken in locating the various Mining Camps. No attempt has been made to show mountain-ranges by hachures, and so the reader is spared the bewilderment usually produced by the ordinary, necessarily inaccurate attempt in this direction. The map was made at Hamburg, Germany, at the Geographical Lithographic Establishment of J. Köhler. The clearness of its execution, the legibility of its lettering and the softness of its coloring leave nothing to be desired.

A fairly large map of Sinaloa was engraved by Edward Stanford, of London, and a very carefully-executed map of Sinaloa by F. G. Weidner, on the scale 1:1,500,000, showing mining camps and geology, is found in *Petermanns Mittheilungen,* Vol. XXX, p. 84.

Sr. García Cubas in 1882 issued a dictionary of geographic names, and a catalogue of places in Mexico, arranged alphabetically and giving the municipality, district, and State in which each place is situated, was published in 1898 by the Dirección General de Estadística of the Secretaría de Fomento. The Anuario de Estadística issued by the same department contains tables of astronomical positions and statistics of mineral production.

Geologic maps of Mexico are not numerous, and at present are not obtainable from official sources, though it is promised that a new one will soon appear with Bulletin 18 of the Instituto Geológico de México.

In 1899, Sr. Antonio del Castillo published a preliminary geologic map on the scale of 1:3,000,000; in which year also appeared the second edition of his *Carta Minera,* which shows the mining camps of the several States on the scale of 1:2,000,000. This map represents a vast amount of labour in compilation, and is doubtless as accurate as the state of information concerning the camps will permit, for only a few of them have been accurately located. A later geologic map on the scale of 1:8,000,000 appeared in the Boletín del Instituto Geológico de Mexico, No. 6, published in 1897.

The Carta Minera of Sr. del Castillo has been in part replaced by the small-scale map of Sr. Luis Salazar in the Trans. Am. Inst. Mining Engineers, Vol. XXXII, p. 303. This map does not, however, reproduce all the camps located by del Castillo.

A general map of some interest is that entitled Carta de Comunicaciones de los Estados Unidos Mexicanos, on the scale of 1:1,000,000, or 15.8 m. = 1 in., compiled by Colonel Bodo von Glümer and published in 1895-6 by the Secretaría de Estado. It corresponds to our U. S. post-route maps, and shows mail routes and telegraph and telephone lines.

A discussion of maps of Mexico would be incomplete without mention of the map of New Spain compiled by Humboldt in 1804 (published in 1812). It is on the scale of 56 miles to the inch, is well engraved, and shows the position of the mining camps with such accuracy as was possible and with a clearness which puts to shame all modern attempts of a similar character. This map is in the Atlas of New Spain, and may be seen in most of the larger public libraries.

In view of the necessarily slow progress of the topographic survey in covering the whole of the Mexican Republic, the writer would call attention to the fact that nearly every mining engineer residing in its territory could add to the sum of accurate geographic know-

ledge by determining the latitude and longitude of his camp. With the modern engineer's transit, latitude can be determined with an error not greater than 1′, or 6,000 ft. As a rule, camps are known as so many hours' ride in a certain direction, but their exact position is never determined.

RECENT ARCHÆOLOGICAL DISCOVERIES IN NORTH-WESTERN AMERICA.*

BY

HARLAN I. SMITH.

The explorations, of which a summary is now presented, were made in the village sites and graves of the southern interior of British Columbia and the interior of Washington; in the shell-heaps and cairns of the coast of Washington and British Columbia; and in the sites along the Columbia River between Portland and the coast.

It is found that the material culture of the prehistoric people was similar to that of the Indians now inhabiting the regions, and that the influence of one culture upon another was greater in earlier times.

The culture of interior southern British Columbia was found to be a unit; that of the coast constituted another unit, and in Central Washington was a culture differing in some respects from that of the interior of southern British Columbia and also unlike that of the coast. The remains in the Lillooet Valley showed influences of the coast as well as of the interior.

The southern interior of British Columbia is arid and the winters are cold. Vegetation is scanty, and, except on the highlands, there are few trees. The prehistoric inhabitants, like the Salish Indians to-day, relied upon many limited resources. They had the salmon from the rivers, besides the deer and the elk, which furnished food and clothing, with bones and antlers for tools and implements. The bark of the sage-brush supplied a fibre for cloth, and many domestic articles were made of stone.

* The archæological investigations here described were undertaken in 1897–1899 for the Jesup North Pacific Expedition, and in 1903 for the American Museum of Natural History. The results of these expeditions are being published in the Memoirs of the American Museum of Natural History under the supervision of Dr. Franz Boas, who directed the whole work of the Jesup North Pacific Expedition. The specimens collected and the photographs taken are deposited in the Museum.

The age of the specimens secured is uncertain, but the absence of European objects in many of the places explored establishes the fact that the remains there found antedate the coming of white traders. Bows and arrows were used; the arrow-points usually chipped from stone, but also ground from slate, pieces of bone, or antler. Digging-stick handles, like those used by the present Indians, were fashioned out of antlers.

In preparing food, pestles and mortars of stone were used, and fish-knives made of slate. Mortars are scarce, but flat stones, which probably served the same purpose, are common. There is no pottery. Baskets or boxes, it is thought, were used for boiling food; the number of burnt and crackled stones found had probably served to heat water.

Circular holes from ten to thirty feet in diameter and two to five feet deep, enclosed by an embankment, indicate that the ancient houses were identical in type with those used in historic time. Two of these still exist, though fast going to ruin. Saucer-shaped depressions mark the sites of summer lodges, conical like those of to-day and the *tepees* of the plains, allying the culture of the region with that farther east.

Among the tools were wedges of elk antlers, stone hammers, adzes or chisels of nephrite, whetstones, carving-knives of beaver teeth, stone scrapers, and drills. Coarse sandstone semi-cylinders, grooved on the flat side and similar to the modern arrow-shaft smoother, were common. These are not found on the coast, and their presence strengthens the affiliation of the culture in this area with that of the plateaus and the east.

There were awls made of bone, skin-scrapers, some of stone like those used by the Shuswap and Thompson River Indians, others of bone; and flat needles of bone, such as are now made of iron and used for sewing cattail stalks into mats to cover the houses. A Shuswap woman was photographed in 1898 while dressing a skin with a chipped-stone scraper exactly like those found in the old sites.

War-clubs were found, one made of copper, others of whale-ribs, and some of these were carved with human heads in a style resembling that of the coast. There were also daggers of bone and of antler.

For dress the skins of deer and birds were used, as well as fabrics of sage-brush bark and other fibres. Head-scratchers, hair ornaments, nose-bars and ear-pendants, copper, bone, and shell beads, perforated teeth and claws of animals, were worn; and the body was

decorated with red and yellow ochre and blue paint. Iridescent abalone shells and dentalium shells were imported from the coast.

For gambling the people had dice of woodchuck teeth, similar to those of beaver teeth still used by the Indians. Tubes were found, like the gambling implements of to-day, and perforated pecten shells such as are used for rattles in the dances of the coast people. The old pipes were made of steatite, shaped like a wine-glass and with incised designs. These pipes and the mortars are like those found as far south as California. The modern Indians occasionally used the tubular pipe, until quite lately.

The art of the people is best shown in the designs on a dagger, on digging-stick handles, dentalium shells and pipes. The circle-and-dot design is frequent here as well as to the south and west. The carving of the whale-rib war-clubs, that of a steatite pipe and some small figures in antler, are of a high order of merit, and must have been the work of a coast artist or of one familiar with that work. The modern Indians paint geometric and figure patterns in red ochre on the boulders; but their performance in this line, as well as in carving and technique, is inferior to that of the objects found in the old sites.

Graves were made in the sand along the streams and on the tops of the lower hills and terraces. They were solitary, or in groups. Graves under rock-slides occur in Nicola Valley. The body was laid on the ground and the rocks above were loosened so as to cause them to slide down and cover the body. In all the graves the bodies were flexed on the side; some were wrapped in cloths and covered with mats of rushes. With the dead were buried the articles used in daily life—arrow-points, celts, needles, beads, and other objects.

There is evidence of only one type and culture in this region. The modern Indians make their graves like the ancient; they know the use of the rock-slide burial, and they interpret the conventional marks found on the prehistoric remains; yet differences exist between the old and the new. The moderns make small arrow-points and believe the large points found in the excavations were made in a mythical period, and the modern pipe is a bowl or has an elbow-crook, like the type found on the plains.

The absence of pottery is characteristic of the whole north-west. Ethnological investigations have shown a connection of the recent culture of this area with that of the Rocky Mountain region.

On the whole, the prehistoric culture of the interior of British Columbia bears a greater affinity to that of the western plateaus

than to that of the north Pacific coast. Both the physical type and the culture suggest that the peoples of the coast and those of the interior developed on distinct lines and that points of resemblance are due to contact, greater in the past than at present. In recent years the region seems to have taken elements from the east.

The coast of British Columbia and Washington has a moist climate. Very warm or very cold weather is unknown, and the vegetation is luxuriant.

The tribes of the coast make ocean-going canoes of single cedar-trees and build large houses of the same wood, which is also made into implements and utensils; and the bark supplies garments, bags, mats, and the like. Their villages border and face the sea, which is their highway, and provides their staple food, the salmon and shell-fish and the seal.

The shell-heaps of refuse from the ancient houses mark the sites of the villages. More than a hundred and fifty of these were noted in a region of less than 1,000 square miles on the north end of Vancouver Island and the opposite mainland. They were generally at the mouths of fresh-water streams, and several hundred yards long by five or six feet high, while a few were miles in length, with a maximum height of over nine feet. These heaps are of great age. The stump of a Douglas fir tree, more than six feet in diameter, stood on one heap, with layers over eight feet in depth, in which were found artifacts and human remains. An ordinary stump on this heap showed four hundred annual rings within its burned periphery, and the circumference of another stump exceeded twenty-eight feet. This indicates an age for the top layers of more than five hundred years, and a greater age for the bottom layers.

The shell-heap at Port Hammond, in the upper Fraser delta, is twenty miles by water from the present seashore, and by land the nearest point of shore is over ten miles away. The modern Indians use the water route, and prefer to live near the shell-beds. It is hard to believe that they would carry shellfish from the present seashore to the heaps at Port Hammond. The time required for building the delta into the sea may furnish a basis for estimating the age of the Port Hammond heaps. These consist almost exclusively of clam and mussel shells, generally with very few artifacts; but in the heaps of the Fraser delta artifacts and human remains are often found.

If the early people, like the Indians of to-day, used tools and im-

plements of cedar, this would explain the scarcity of archæological specimens in the shell-heaps of the sea beaches.

Besides the points used for fish-hooks and harpoons, net-sinkers of perforated pebbles were found, with fish-knives of slate, pestles, and mortars.

House sites are sometimes indicated in the more modern heaps by an embankment enclosing a rectangular level space. These suggest that the old houses were of great size and made of planks, like the present dwellings of the Indians. Large houses would be needed in this region of continued rains. In building, wedges and other tools of cedar were probably used, besides those made of antler and stone. At Fort Rupert, in 1898, we photographed a Kwakiutl Indian who was sharpening a stone adze like those found in the shell-heaps. The stone pestles were no doubt used as hammers in carpentry, as they are by the Indians to-day. Mats of cedar bark are used like tapestry by the modern Indians to shut out the wind from their houses; and the earlier people probably did the same.

Numerous pebbles with battered ends were found, such as are still used in a game resembling quoits. A few short tubular pipes were found.

The art of objects found in the lowest layers of the shell-heaps seems to be better than that of the modern work. A small carved mask of soft coal is particularly remarkable. Incised geometric designs were found.

Pecked petroglyphs of realistic character were seen near Nanaimo. Purely pictographic art is not found, and the circle-and-dot design, common among living Indians, is wanting on archæological specimens. Articles of use were decorated with sculptured animal forms. The realistic art, as a rule, is cruder than that of the north, and resembles that of the Lillooet Valley near-by, and perhaps that of the region between the lower Fraser River and as far south as the Dalles. It bears a likeness to some of the old carvings of the interior.

Shell-heaps, cairns, and mounds cover the graves, and artifacts are not found in these graves.

The burial-mounds of the region present similarities of structure with the cairns; and one may be derived from the other.

Skeletons are rarely found in the shell-heaps, except in the deltas of the Fraser, Stillaguamish, and Skagit Rivers. In the Fraser delta they were usually found in the rear portion of the heap, with numerous unbroken strata above them. Two distinct types are represented in the remains, apparently co-existent, since they are

found in the same layers. If tree-burial prevailed in former times as at present, it would account for the scarcity of human remains in the shell-heaps of the coast.

The objects found in the heaps of the lower Fraser River are more numerous and of higher artistic value than in those of the coast or the other deltas. The difference in chaarcter between the shell-heaps of the deltas and the coast seems to be due to conditions of soil and modes of life.

The prehistoric people lived in many respects like the present natives of the Fraser delta. They depended largely upon shell fish; fished, and used retrieving harpoons for large sea-mammals; and they hunted the mountain goat, the deer, and the elk. They made garments of skins, and they were workers in wood. Physically, they were of two types, which Prof. Franz Boas describes as follows:

> The one type is characterized by a narrow head, the narrowness of which was emphasized by lateral pressure, with a marked median ridge on the forehead, narrow and high nose and rather narrow face; the other by a wide head (produced partly by antero-posterior pressure) and a wide face.

The natives of the British Columbia coast probably did not chip stones. The chipped points frequently found on Fraser River and at Saanich resemble those of the Thompson River region. Those of Puget Sound and the coast of Washington are more like the chipped points of Columbia River. Some objects frequently found in the interior are not met with in the shell-mounds of Fraser River. Neither chipped stone drills, nor knives, nor sandstone half-cylinders, nor dice of teeth, were found; and there were no objects buried with the dead. The similarity of culture of the prehistoric people in the Fraser River delta and in Saanich coincides with the distribution of languages at the present day. The Salish languages reach the Gulf of Georgia and southward to Shoalwater Bay. In the same latitude the same dialect is spoken east and west of the Gulf of Georgia. Vancouver Island and the opposite mainland must, therefore, have had a common history. It is probable that an early migration from the interior carried the art of stone chipping, the decorative art, and the pipes to the coast. Here it should be noted that the highest type of art on the Northwest Coast never extended south of Comox, and never reached the west coast of Vancouver.

A few specimens point to similarity between the prehistoric people of the Fraser delta and those of the north. The most striking is the labret, which in historic time was not found south of Milbank Sound.

One result of the migration referred to may have been the modification of burial customs in the southeast of Vancouver Island. The earliest-known form of burial, long antedating contact with the whites, was in stone cairns. Later, the bodies were put in wooden chests, which were placed on the ground, or in trees, in caves, or on little islands. Sometimes a canoe was used for a chest.

On the whole, it may be said that the culture of the ancient people of the shell-heaps was in essential particulars similar to that of the tribes now inhabiting the same area, though it was more strongly influenced from the interior. To follow the course of its development it will be necessary to search out older deposits.

Central Washington is arid, with a climate resembling that of the southern interior of British Columbia, though warmer in summer and colder in winter. There is less vegetation, and, except in the river bottoms and in irrigated districts, there are no trees.

The number of tribes was great, and this suggests that more than one area of culture may have existed in the region. A definite age cannot be assigned to the articles found.

The implements used in procuring food include chipped projectile points, but rubbed points were rare. There were some digging-stick handles. There were many net-sinkers of notched and grooved pebbles, rare in the north and not common on the coast, except at the mouth of the Columbia River. Some pestles used were unusually long, and some had tops representing animals' heads.

Sites of ancient semi-underground houses were seen, with stones on top of the embankment; and there were circles of stones, which may mark lodge sites. The modern Indian lodge is identical in shape with that found in the north. Arrow-shaft smoothers were seen, besides tubular pipes, and one consisting simply of a bowl.

An antler carving of a human figure showed the ancient form of dress; a feather headdress, like that seen to-day as far east as the Dakotas, the hair ornamented with dentalium shells, the body painted and wearing a fringed apron around the loins. This object was found in the grave of a little child. It was of good technique.

The circle-and-dot design was common. Pictographic paintings in red and white were seen.

There were three methods of burial. In the stretches of country locally known as *scab-land* there occur groups of low, dome-shaped knolls, consisting of fine volcanic ash, left, as it seems, by the wind. The prehistoric Indians used many of the knolls, each for a single

grave. In one grave was found a cyst of thin slabs of basalt. Dentalium shells were found in the grave and the body was flexed on the side.

Rock-slides had been used as burial-places, as in the north. Rings of stones were seen, and excavation within these brought to light the cremated remains of several bodies with shell-beads and ornaments.

Evidences of the close communication of these people with the tribes of the southern interior of British Columbia are: preponderance of chipped over ground points, digging-stick handles, sites of semi-underground houses, pestles with animal-head tops, arrow-shaft smoothers, tubular pipes, the circle-and-dot decoration, engraved dentalium shells, rock-slide sepulchres, and the burying of articles with the dead; all common to both regions.

Certain pestles and clubs of stone differed from those found in British Columbia, and chipped implements were made of a greater variety of stone and more were of beautifully-colored materials. Notched and grooved sinkers were much more common, and sap-scrapers were not found.

Material of the same art as that found in the Dalles region was seen. The people of the Yakima Valley clearly had dealings with the tribes as far north as the Thompson Valley and southward to the Dalles of the Columbia. The present Indians, it may be noted, travel more widely than would be necessary to distribute their artifacts thus far.

Very little evidence of contact between the people of the coast and those of the Yakima Valley was discovered. Many of the stone pestles and clubs were different from those of the coast, but sea-shells of several species were seen, and a pipe, clearly of north-west coast art, was found far up the Toppenish River, a western tributary of the Yakima.

The culture of the prehistoric people resembled that of the present natives, and differed greatly from the ancient and modern culture of the coast to the west, and somewhat from that of the southern interior of British Columbia to the north.

In general, the culture of the North Pacific coast does not extend far inland. Northward its limits are unknown, but southward it coalesces with that from the Columbia River in the region between Seattle and Shoalwater Bay. In the interior we have a plateau culture differing somewhat at the north from that at the south. Several small culture areas lie adjacent to these. Each culture ap-

pears to have developed independently, but to have been influenced by one or more of the others.

Experience shows the advisability of conducting archæological work in co-operation with students of living tribes. A study of the Indian living in the country under exploration usually throws light on archæological finds made there, while an understanding of the antiquities of a region helps the study of the Indian living there. The continuity of the historical problem is met by a continuity of method.

In selecting fields of operation it seems best always to continue explorations in an area so far distant from one already examined that new conditions will be encountered. This will make it probable that new facts will be discovered, if not a new culture area. At the same time the new field should be so near to the old that no culture area may intervene. Thus the culture boundaries may be determined, and new areas discovered. Exploration carried on by this continuous method makes the experience already gained of service in a new and adjacent field, while discoveries in such a new field may lead to a better understanding of those previously examined.

It remains to determine the northern, eastern, and southern limits of the general plateau culture, how far it may be subdivided into local areas, and the inter-relation of these with each other and with outside areas.

Specimens are few from the whole region lying between the mouth of the Columbia, the Santa Barbara Islands, the Cliff and Pueblo region of Arizona and New Mexico, and the Mound region of the Mississippi Valley. Literature on the archæology is scanty. That whole region north to the Arctic and all that of the plains towards the east and south throughout the plateaus and Nevada remain to be explored.

THE ERUPTION OF VESUVIUS.

The activity of Vesuvius since last February culminated early in April in an outburst that will rank among the historic eruptions. An account of the occurrence in the BULLETIN will be deferred until it can be treated more accurately and adequately than at present; but some facts of interest from the press reports may be given.

April 5.—The volcano became strongly active, and large masses

of rock were hurled as far as the lower station of the funicular railway.

April 6.—The lava-flow arrived within three or four miles of Bosco-Tre-Case, on the southern slope of the mountain; another stream threatened Ottajano, on the north-eastern slope. A new crater was formed.

April 7.—Bosco-Tre-Case, between the volcano and Pompeii, was buried under lava, which swept down in a torrent from the new Ciaramella crater. There were two streams from this crater, one of which, 600 feet wide, moved towards the centre of the town, which had been abandoned by its inhabitants. The town was completely surrounded by lava at 6 A. M. The south side of the cone of Vesuvius collapsed. Another new crater opened on the north side of the cone in the Atrio del Cavallo, and ejected large quantities of lava and stones. The old crater, also, was in violent eruption. Gray volcanic ash fell in the streets of Naples, and explosions were incessant.

April 8.—Dr. Matteucci, the director of the Royal Vesuvian Observatory, reported:

The eruption of Vesuvius has assumed extraordinary proportions. Yesterday and last night the activity of the crater was terrific and ever-increasing. The neighborhood of the Observatory is completely covered with lava. Incandescent rocks are thrown by the thousand to a height of 2,400 and 3,000 feet, and fall back, forming a large cone.

Another stream of lava has appeared from a fissure, the position of which is not well defined. The noise of the explosions and the rocks striking together is deafening. The ground is shaken by strong and continuous seismic movements. The instruments threaten to break. It will probably be necessary to abandon the Observatory, which is very much exposed to electric shocks. The telegraph is interrupted.

A telegram from Naples announced that Ottajano, Poggio Marino, and Somma had been abandoned. The lava was flowing seven feet deep through the streets of Ottajano. A telegram from Montenegro said that a shower of black dust, like iron filings, supposed to come from Vesuvius, fell throughout that country, covering the surface to a depth of a millimeter with an iron-gray deposit.

April 9.—The lava-stream that had been moving towards Torre-dell' Annunziata stopped flowing, and the eruptions were less violent. Clouds of volcanic ash still filled the air, making the day so dark that navigation was dangerous in the Bay of Naples. The seismic instruments on previous nights recorded several earthquake shocks. The dynamic action of the volcano appeared to be considerably diminished. Professor Matteucci reported at 6.30 P. M. from the Observatory:

The explosive activity of Vesuvius, which was very great yesterday and was accompanied by very powerful electric discharges, diminished yesterday evening. During the night the expulsion of rocks ceased, but the emission of sand increased, completely enveloping me and forming a bed more than ten centimeters deep, which carried desolation into this elevated region. Masses of sand gliding along the

earth created complete darkness until 7 o'clock.* Several blocks of stone broke windows of the Observatory. Last night the earthquake shocks were stronger and more frequent than yesterday, and displaced the seismic apparatus. Yesterday afternoon and this morning torrents of sand fell. While I am telegraphing several balls of fire rise with loud rumbling from the enlarged craters and the new elevated crevasses.

April 10.—Professor Matteucci reported from the Observatory:

Last night was calm except for a few explosions of considerable force from time to time. At 4 o'clock this morning the explosions became more violent. The seismic instruments of the Observatory record strong disturbances in the interior of the mountain.

April 11.—Vesuvius became comparatively quiet.

CHANGES ON THE EARTH'S SURFACE.

Studies of the surface of the earth have never been so numerous or so varied as at present. There are still many gaps unfilled, however, and Richard Tronnier, head-master at Hamm, Westphalia, has called attention to some of them (*Pet. Mitteil.*, No. 2, 1906). While the atmosphere and the hydrosphere, on account of their circulation and large practical interest, have had the lion's share of attention, there are phases of the phenomena of the earth's crust which are only beginning to receive due investigation. Periodicals devoted to seismology, for example, are of recent establishment. In addition to the study of tectonic changes, to which great attention has been given, investigators have been chiefly concerned in such modifications of the earth's surface as are made by the changing boundaries between land and sea, the growth of deltas, the spreading boundaries of cities, etc.

Tronnier believes it is highly important that systematic efforts should be set on foot to collect in a systematic manner the facts concerning the changes of the earth's surface constantly going on before our eyes, and he thinks that these data, scientifically collected and arranged, would form an important document in the history of our planet. He presents a considerable number of occurrences reported last year as illustrations of the work which, he suggests, should be done. A number of them may be referred to:

The steamer *City of Panama* reported in January that in 16° 15′ N. and 100° 29′ W. she had passed through an area, a mile wide, that was so thickly covered with trees, plants and the bodies of animals that she could hardly force her way. It has been suggested that this phenomenon may have been caused by the destruction of one or more of the islands of the uninhabited Revilla Gigedo group.

The island Nushima was seen by the natives of some of the Bonin Islands to rise above the surface of the Pacific on Nov. 14, 1904. It finally attained a height of 480 feet. It was found in July, 1905, that the island had gradually become reduced in size until its highest point was only 10 feet above the sea and its periphery had greatly decreased. It was thought that in a few weeks more it would entirely disappear.

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* The language is dark, like the sand.

The island Milli, in the Pacific, was almost entirely destroyed by the assaults of winds and waves, only a wretched sand-waste remaining.

The Portuguese fishing-port and watering-place Espinho became, to a large extent, the prey of great sea waves that kept eating away the banks and undermining houses, and, at the end of January, the destruction was augmented by a hurricane that destroyed 81 houses. It was believed that the existence of the entire town was threatened.

Early in the year a strip of coast near Dover, England, fell into the sea. The area of rock was estimated to weigh 250,000 tons. It was the largest rock-slide on that coast in a half century.

Fifty-eight persons were killed by a landslide from a mountain overlooking Lake Loen in Norway, the displaced waters overwhelming a town on the opposite shore and carrying a small steamer 300 meters inland.

On Nov. 5, about 15 acres of land on the edge of Moen Island slipped into the Baltic Sea. The land, with the forest that partly covered it, was valued at 10,000 crowns.

The Rio Grande changed its course for a distance of several miles, placing the United States town La Mesa on the Mexican side of the river.

The Spitzberg, a small eminence near Krielow, Prussia, often climbed by tourists for the fine view it afforded of the Havel valley, was entirely removed by a railroad company.

These examples include changes wrought by the sea on islands and coasts, by rock-slides and flowing water on the land, and by human agency on a feature of the topography.

The single-handed observer can do little of permanent value in the collation of accurate data relating to such occurrences as these; but there is a great opportunity for the organization of systematic work in this new field.

Dr. Supan, commenting upon the suggestion offered by Mr. Tronnier, says that it should be favourably received, that it is well worth the attention of the next International Geographical Congress at Geneva, and that it is to be hoped that the difficult question of the organization of such observations, to be carried on all over the world, will, at least, make important progress towards solution at that meeting.

LAST YEAR'S WORK OF THE MICHIGAN GEOLOGICAL SURVEY.

During the summer of 1905 joint topographic work was continued in connection with the U. S. Geological Survey, first around Marquette, under J. M. Whitman. Here the work proved to be of unexpected difficulty and complexity; but it is hoped that the resultant map will be of a high degree of accuracy and interest. In the Lower Peninsula the topographic work now completed includes not only the Ann Arbor quadrangle, but a strip east of the international boundary, and most of this is either published or will be in a few weeks. The work is now being extended northward around Pontiac. A detailed map of the Black River from Bessemer north to Lake Superior has been prepared by W. C. Gordon to illustrate the cross-

section of the copper-bearing rocks (and, in fact, from the Laurentian granite) to the lake.

Last summer Prof. I. C. Russell, of Ann Arbor, continued his studies of the surface geology of the Upper Peninsula westward from the Menominee and Crystal Falls districts in a harmonious scheme of work with Mr. Frank Leverett of the U. S. Geological Survey, who covered the eastern end of the Upper Peninsula studying the hydrography and surface and glacial geology, and they were assisted by Mr. W. C. Gordon, Prof. C. A. Davis, and Mr. G. L. Tower on behalf of the State Survey.

Dr. Alfred C. Lane, the State Geologist, was largely employed in the copper country studying diamond-drill cores and other recent developments in the copper district. In the lower parts of the State Mr. W. F. Cooper was completing his report on Bay County and assisting Prof. W. H. Sherzer in his report on Wayne County. Prof. C. A. Davis is making a monographic study of peat. He has also nearing completion a report on Tuscola County, a contour map of which appeared as Plate IV of the annual for 1903.

The following counties have therefore been covered: by State Survey contour maps, Huron, Tuscola, Sanilac, Bay, Kent, Monroe, and parts of Arenac and Iosco; by the United States Survey, the Marquette range in Marquette County, the Menominee range in Menominee and Dickinson Counties, the Gogebic range in Gogebic County, and a good part of Iron County. By the co-operative Survey, Wayne County, most of Washtenaw County, and parts of Monroe, Lenawee, Macomb, Oakland, and Livingston Counties, and the neighbourhood of Marquette in Marquette County.

The annual reports of the Board of Geological Survey of Michigan for 1903 and 1904 were issued last year. The 1903 report contains contour maps as follows:

One of Bay County, prepared by W. F. Cooper, whose report on that county is now waiting publication. This county is, in general, very flat, and requires and has been covered by a large series of survey drains, and this map, which is based upon these drain levels, railroad levels, lines of levels for macadamized roads, and a few other lines of levels especially run, is therefore in considerable detail, the contour interval being five feet. It also shows areas of former and present flowing wells;

One of Tuscola County, prepared by Prof. C. A. Davis. A contour map of the Ann Arbor quadrangle from latitude 42° to 42° 30′ N., and longitude 83° 30′ to 84° W., which shows not only the contours but the wooded areas, in a part of the State which

may be considered as thoroughly settled. This survey was made by the U. S. Geological Survey in co-operation.

The report also contains papers on the water supply of the Upper and Lower peninsulas, with maps, and a special paper by B. E. Livingston on the relation of the soils to the natural vegetation in Roscommon and Crawford Counties, with a map. Other more geological subjects treated are limestone, building-stone, road materials, transmission of heat into the earth, the grain of rock, the theory of copper deposition, and the Keweenawan lodes. All these papers have special reference to conditions in the copper country.

There is also a note on recent shore-formations by W. M. Gregory, which gives interesting data regarding the growth of Tawas Point, a cuspate foreland north of Saginaw Bay, which has been growing at the rate of something like 60,000 square feet a year.

The annual report for 1904 contains a paper published with the permission of the U. S. Geological Survey on the Failure of Wells along the Lower Huron River, in 1904, which failure was locally attributed to a deep well. Mr. Fuller, the author, however, attributes the failure mainly to deficient rainfall and extensive ditch-draining to lower the ground water-level at the point of the intake.

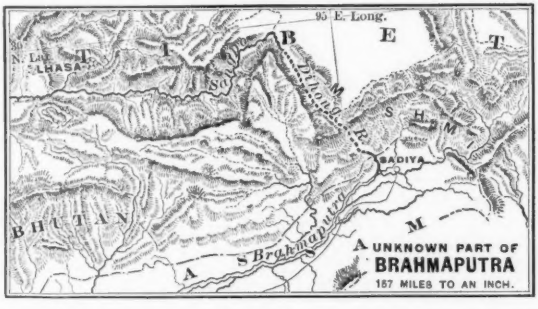
The most extensive part of this report is an article by Prof. I. C. Russell on the conditions along the north shores of Lakes Huron and Michigan, with numerous illustrations, including eskers and drumlins, cut terraces and cliffs, sand dunes and gravel bars. Prof. Russell's theory of the origin of certain drumlins, that they are carved out of a sheet of clay trended from the northwest by ice moving later in a different direction, is of general interest. This theory is applied especially to the drumlins around Menominee. Another area which is beautifully marked in the mapping is that of the Les Chenaux Islands, east of Mackinaw, the pronounced trend of which is determined by the axes of the drumlins.

The personal report of the State Geologist contains various economic notes; the report of the joint committee on the stratigraphy of the Lake Superior region, with some personal comments on the same and some notes on the grain, and also an excellent colored plate showing the increasing coarseness of the grain as it occurs in certain diamond-drill cores in the copper-bearing formation. An interesting general conclusion from the studies of grain is that in case of the much-discussed Laurentian gneisses the intrusive gneisses were considerably superfused, while the rocks into which they were intruded were almost reliquified. Some notes are also given on the prospects of Lake Superior gold mining, and oil and gas.

PROPOSED EXPLORATION OF THE BRAHMAPUTRA.

The London *Times* (weekly edition, April 13) says that a resolution has been adopted by the Council of the Royal Scottish Geographical Society and ordered to be submitted to the Secretary of State for India in Council. It is to the effect that, in view of the great regret felt in geographical circles throughout the world that the proposed expedition down the Brahmaputra to Assam did not take place at the close of the Tibet Mission, 1903-1904, the Council trust that the Indian Government will now see their way to carry out this exploration, which is of extreme interest and importance, on the following grounds:

By it would be finally settled the question of the connection of the Sangpo of Tibet with the Dibong (Brahmaputra) of Assam.



The known difference of levels renders it certain that the river must descend from Tibet to the plains of India by great waterfalls exceeding all others in height and volume. If these falls (which are said by the Tibetans to exist) should be discovered, much light would be thrown on the geology of the region. In particular we might expect information as to the structure of the country traversed, and the relation borne by the vast Himalaya ranges to the elevated plateau against which they abut.

Nothing is known at present of the tribes who inhabit the tract through which this part of the river passes. Valuable collections of the fauna and flora would probably be obtained. It is possible that a good route might be discovered leading from Assam into Tibet by the great river; such a route would have much importance

in promoting British trade with Tibet. The resolution is signed by the president, Professor James Geikie.

This part of the course of the Brahmaputra has not been surveyed on account of the hostility of the Mishmi tribes among the mountains. No exploring party has been sufficiently strong to push through this inhospitable country.

GEOGRAPHICAL RECORD.

AFRICA.

THE DUKE OF THE ABRUZZI STARTS FOR AFRICA.—The expedition of the Duke of the Abruzzi to Mount Ruwenzori sailed on April 17. Twelve Europeans are in the party: the Duke of the Abruzzi, Captain Cagni, Dr. Cavalli, Lieut. Winspeare, Dr. Roncati, a geologist, Signor Vittorio Sella, two Alpine guides, two porters, and an assistant photographer.

THE FRENCH CONGO.—A decree issued on Feb. 11, 1906, modifies the territorial divisions of the French Congo (BULLETIN No. 3, 1904, p. 169). The region is divided into four districts—Gabon, Moyen-Congo, Oubangui-Chari, and Tchad—all of which will be under the administrative control of the Commissioner-General residing at Brazzaville. The first three are colonies with financial and administrative autonomy, while the Tchad district is a military territory attached to the Oubangui-Chari. The capitals of the colonies are Libreville, Brazzaville, and Fort de Possel.

The territorial modifications do not greatly affect the division of the area made in 1894, but the Gabun receives some accession of territory by the incorporation of coast districts formerly included in the middle Congo. The Gabun colony now comprises all the basin of the Ogowe, with coast districts from the Spanish territory in the north to Sette Cama in the south. The Chad territory includes practically all the French portion of the Shari basin, together with Wadai and Kanem.

Commissioner-General Gentil has returned to the Congo to carry out the programme of administration formulated by the Colonial Minister. It is designed to guard the natives against ill-treatment, preserve the resources of the country, and rationally develop them.

THE NILE FLOOD AND ITS VARIATION.—Captain H. G. Lyons, Director-General of the Survey Department of Egypt, has been making a study of the Nile floods in relation to pressure conditions and rainfall (see this BULLETIN, Oct., 1905, pp. 601-602). His latest paper is entitled "On the Nile Flood and its Variation" (*Geographical Journal*, Sept.-Oct., 1905), and concerns the possible correlations between Nile floods and other periodic oscillations in solar and meteorological phenomena. Several writers on the Nile have asserted that an alternation of high and low floods is evident, and have sought a relation between this alternation, on the one hand, and sun-spots (Fritz), deficient monsoons in India (Willcocks), solar weather (Lockyer), and Indian pressures and monsoon characteristics

(Eliot), on the other. Captain Lyons has undertaken to determine whether there is a periodical variation in the Nile flood, whether a series of good floods is regularly followed by one of deficient floods, or whether excess and deficiency succeed one another irregularly. The Nile flood represents the run-off of an area over which the East African monsoon rains fall in June, July, August, and September. Hence the variation of this rainfall is the real thing to be studied. The flood is practically independent of the White Nile, and for this reason no attention need be paid to the meteorological conditions and rainfall in that basin for the purposes of the discussion.

Fairly reliable records of the maximum readings of the Nile floods are available for eighty years past, and there does not appear to be any definite relation between the sun-spot curve and either the five-year or the yearly flood-curve. Hence the Abyssinian rainfall, upon which the flood depends, seems clearly to be due to the combined effect of causes which usually prevent any coincidence between high and low floods and the maxima and minima of the sun-spots from being recognized. A prediction of better floods when a sun-spot maximum is approaching seems to Captain Lyons to go further than the evidence warrants. Nor does the Abyssinian rainfall show a direct and simple relation to + and — pulses of the solar weather cycle, as discussed by the Lockyers for India and Mauritius, and suggested also for the Nile floods. Egypt and Abyssinia seem to form an area whose meteorological conditions are not regularly consonant with those of India as discussed by Sir N. Lockyer, agreeing at times and then differing greatly.

A comparison of the Nile flood-curves with the curves of Brückner's climatic cycle shows that the former approaches to some extent the curve which Brückner gives for areas which he classes as "temporary exceptions," but that the normal Brückner cycle cannot apply to Abyssinian rainfall, and no predictions of coming floods can be based on this cycle. In the variation of the Nile from year to year there is no trace of any definite periodicity which could be of assistance in forecasting the probable duration of any succession of high or low Nile floods. There is a short-period fluctuation in the Abyssinian rainfall, but no more or less regular increase for a number of years, and then a decrease. Further, there is not the correlation between the Indian monsoon rainfall and the Nile floods which has often been stated to exist. Captain Lyons finds that, so far as present knowledge goes, the Nile flood depends primarily on the strength of the monsoon air-currents from the Indian Ocean, modified by the pressure conditions over northeastern Africa.

R. DEC. W.

SENATE DOCUMENT No. 104, 59TH CONGRESS, FIRST SESSION, contains copies of papers relating to the claims of Cope Whitehouse to certain desert lands in Egypt, transmitted by President Roosevelt on the 4th of January, in response to the Senate's resolution of December 7, 1905.

These "desert lands" are better known to those who have followed Mr. Whitehouse's career as the Wadi Raiyan or the Raiyan-Moeris, first explored by him*;

the desert depression west of the Nile and South of Cairo, which is to be filled from the Canal of Joseph by sluice-ways eight miles in length.

Among the papers, all interesting to geographers and Egyptologists, is a bibliographical index (pp. 50-51).

* BULLETIN, 1882, pp. 85–108; 1889, pp. 530–582.

CLIMATE OF SOUTH AFRICA.—F. S. Watermeyer, Government Land Surveyor, in a paper on South Africa south of the Limpopo (*Scot. Geogr. Mag.*, Jan., 1906) summarizes the climatic features of that region. The Portuguese territory along the east coast is well watered. There is abundant grass, forming excellent pasturage for cattle, sheep, and goats. Semi-tropical fruits can be grown, and the staple cereal products are maize, kaffir corn, and rice, kaffir beans, etc. Along the slopes of the Drakenberg, at about 3,000 ft., coffee, tobacco, and citrus fruits—bananas, pines, etc.—grow luxuriously. Semi-tropical plants and fruits grow less abundantly as the latitude increases southwards. The best wheat-producing parts of South Africa (where no irrigation is used) are on the west coast of Cape Colony from the Elephants' River as far as Mossel Bay and a strip of land along the western slopes of the Drakenberg where the rainfall during April, May, and June is sufficient.

Maize, kaffir corn, manna, potatoes, beans, and peas can be grown throughout South Africa by irrigation, and as summer crops wherever the rains extend; semi-tropical fruits on the Low and Middle Veld, and along the eastern slopes of the Drakenberg southwards; peaches at all altitudes to 2,000 feet or over; plums, pears, apples, etc., especially on the High Veld. The zone of maximum rainfall along the eastern and southern slopes of the Drakenberg and the coast ranges on the south as far as Swellendam is marked by belts of forests.

The altitude of the high plateaux of South Africa lowers the temperature considerably. Farther north, in the Middle Veld and low country, and on the east coast, temperatures of 115° to 120° in the shade are reported as of frequent occurrence. From November to April the rains in the north and east keep the air moist and salubrious, although the temperature is often very high. In winter the air is dry, cold, and healthy. In June, in the Bush Veld, temperatures 12° to 22° below freezing (Fahr.) have been registered between 2 and 6 A. M., and by noon the thermometer may stand at 90°. About the equinox, in September, strong winds from southeast or northwest sweep over the country. These gales generally last intermittently from August to October, and are the precursors of the rains in South Africa. R. DEC. W.

RAINFALL MAP OF AFRICA.—The new rainfall map of Africa, shown at the meeting of the British Association last September by Dr. A. J. Herbertson and Mr. P. C. Waite, shows that the heaviest rainfall occurs around the Kamerun Mountains, where one station—Debunja—has an annual precipitation of about 400 inches, which is not much less than that of Cherrapunji, in the Khasi Hills of India, the record rainfall station of the world. The striking features of the map as a whole are (1) the belt of wet climate round the equator, broken by a drier area near, but not touching, the east coast; (2) the dry belts round the tropics, which do not extend quite to the east coast in the south; (3) the wet southwest and northwest corners; (4) the continuous wet area of varying width which fringes the east coast from Cape Colony to the equator. R. DEC. W.

CYCLONIC WEATHER CONTROL AT KIMBERLEY.—An interesting study of cyclonic control over the hourly normals of the more important meteorological elements at Kimberley is contributed by J. R. Sutton to the *Transactions of the South African Philosophical Society*, Vol. XVI, Pt. 2, Oct., 1905 ("On the Variation of the Hourly Meteorological Normals at Kimberley during the Passage of a Barometric Depression"). The number of separate cyclones studied is 105, and the hourly elements have been considered on the day on which the centre

passed over, together with those on the day before and the day after. The depression does not in the least obliterate the ordinary diurnal variation of the barometer. The mean temperature of the first day is from one to two degrees higher than the normal; on the second day it is, on the whole, about 0.5° higher still, and on the third day it is between 3° and 4° lower than the normal. In front of the depression the range of temperature is increased; in the rear it is decreased; while along the trough it is not greatly affected. Such variation as there is in the amount of water vapour is more noticeable in the dryness following the trough than in the dampness preceding it.

There is a positive deviation in the amount of cloud during the second day, and a negative deviation on the third. Cirriform clouds are not much affected in quantity by the depression, the chief influence being in the cumulus and other low forms. In every 100 depressions, rain is observed in 30 on the first day, in 44 on the second, and in 27 on the third. The diurnal variation in wind velocity is evident during the passage of a depression, but the shape of the ordinary curve is considerably modified.

This study of Sutton's is in line with the growing effort to separate the *cyclonic* control of weather elements from the diurnal, monthly, and annual controls. Contributions towards the cyclonic control of rainfall have recently been made by Mill, and now comes this investigation from Kimberley, in which the cyclonic control of the other weather elements is considered. R. DEC. W.

STUDYING GERMAN EAST AFRICA.—The Commission for the geographical exploration of the German colonies has published the plan of work which it will endeavour to carry out. The first investigators whom it is sending to the field are Prof. Dr. K. Weule, whose headquarters will be at the station Kondoa-Irangi, on the western edge of the Masai Steppe, and Dr. F. Jäger, whose field is in the region of interior drainage between Mount Kilimanjaro and Victoria Nyanza.

AMERICA.

CONTRIBUTIONS TO THE HISTORY OF AMERICAN GEOLOGY.—Over 500 pages of the *Annual Report* of the United States National Museum for 1904 are given to a work bearing this title by Dr. George P. Merrill, Head Curator of Geology in the Museum. It is a consecutive history of the rise and progress of American geology from 1785 to recent days. A part of it was first presented in a series of lectures to students in geology in Columbian University, Washington, though many of the facts were gathered later while looking up the records of the early Government surveys. The work Dr. Merrill has carried out is most desirable, and will be very useful. Such a history, if at all comprehensive, should show not merely what has been done and by whom and how it was done, but should also bring into clear light the gradual growth of the science and the development in geological observers of the power both of observation and deduction. This is what Dr. Merrill has done.

He calls attention to the errors and crudities of the early workers, but shows these pioneers also as men who had received little or no preliminary training in observation and deduction, who had access to very few books, and who had almost none of the information with which the geologist of to-day begins his career. Trained geologists, of course, know the story of the evolution of their science, but this history cannot fail to be of value and interest to younger students and the general public, who will see in this work "by what years of toil each new

fact has been unearthed, cleansed of the débris which obscured its outlines, and treasured up in such form that it is now possible for the student in a few short years to encompass the garnerings of a century."

Many portraits of the long line of our geological workers are given, and also appendices showing the gradual development of the geological column as it appears in the principal text-books and biographical sketches of the leading workers in American geology. The index is copious.

LOCAL GLACIATION IN THE CATSKILLS.—It is a well-known fact that the elevation of the Catskills gives to them both a lower mean annual temperature and a greater rainfall than the lower parts of the State. Evidently, therefore, it is natural to expect that during the closing stages of the Ice Age local glaciation lingered in the higher mountain valleys after the icecap itself had disappeared. It has been shown that this was the case in other mountain regions in the eastern United States—the Adirondacks, Green and White Mountains, and Ktaadn, in Maine; and both Chamberlin and Smock have called attention to the probable existence of such glaciers in the Catskills. The first definite proof of this is brought forward by J. L. Rich (*Jour. Geol.*, Vol. XIV, 1906, pp. 113-121), who both describes and illustrates the clear evidence of local glaciation in the Flybrook valley, a tributary to Schoharie Creek. There are distinct concentric moraines in a cirque-like valley with enclosing mountains rising 3,360 to 3,448 feet above sea-level. Rich shows that they are concave upstream, proving local glaciation as contrasted with general, and that they merge upstream into descending lateral moraines. His evidence is convincing, and is an important contribution to the Pleistocene history of New York. It raises an interesting question here, as in other mountain regions of the East, as to the extent of this local glaciation. The answer ought not to be difficult, but, so far, it has not been given in this country. Judging from the facts discovered in the British Isles, we have reason to suspect that our Eastern mountains were important factors in the waning stages of the Ice Age, and in scientific study the present geography ought to determine this point. The Catskills offer an opportunity for such a study. R. S. T.

CLIMATIC FEATURES OF THE ICE AGE.—Prof. Albrecht Penck, in a recent number of the *Geographical Journal* (Feb., 1906, Vol. XXVII, pp. 182-187), presents an interesting discussion of the climatic conditions which led up to the Pleistocene Ice Age. His conclusion is that a rather slight decrease in the annual temperature—perhaps no more than 2°-3° C.—will suffice to cause an Ice Age if connected with a diminution of the summer temperature. The close parallelism of events now in progress in both the northern and southern hemispheres indicates a common origin both for recession of glaciers and desiccation of arid lands. This cause seems to be a very slight increase in temperature, thus increasing the ablation of glaciers and the evaporation in arid regions. The argument leading up to these conclusions is ingenious and convincing, but too long for presentation in a brief abstract. R. S. T.

COON MOUNTAIN'S SO-CALLED CRATER.—Messrs. D. M. Barringer and B. C. Tilghman have made an examination of Coon Mountain in Arizona, and the results of their work are published in the *Proceedings* of the Academy of Natural Sciences of Philadelphia (December, 1905). Coon Mountain or Butte rises above the plain about five miles south of Sunshine station in Coconino County, Arizona. The evidence collected has convinced the investigators that

the "crater" was produced by the impact of an iron body falling out of space. The so-called mountain consists of a circular ridge from 130 to 160 feet in height, surrounding an almost circular depression in the earth varying from 3,600 to 3,800 feet in diameter and about 400 feet deep. Viewed from the inside the surrounding ridge is about 560 feet above the level of the crater bottom. As this hole has a general resemblance to a crater, some observers have surmised that it was really the crater of a long-extinct volcano. The rim around it, however, is not composed of volcanic outpourings; the hole penetrates strata of red sandstone, yellowish limestone, gray sandstone, and, finally, a brownish sandstone, in which it terminates. The writers dismiss as untenable the theory that this is a volcanic crater.

Another theory is that the hole was produced by a steam explosion; but the vast amount of steam required could be stored up only in regions of volcanic activity, and there is no evidence that this was ever such a region.

The writers believe the evidence to be overwhelming that the cavity was formed by the impact of a large meteorite. Much of the rock was ground by the collision into fine particles and almost impalpable dust, and a great part of the crater rim is formed of this débris. The colliding body itself was, to a large extent, broken into pieces. Borings have revealed small fragments and splinters of it, but no large piece has been found beneath the floor of the crater. On the other hand, several tons of meteoric iron have been collected around the crater. Seven pieces of it weigh from 600 to over 1,000 pounds each, and smaller pieces were found around the crater to a distance of two and a half miles. These iron specimens contain iron, nickel, iridium, and platinum, and there are millions of particles of it scattered far and wide around the crater. A shaft is now to be sunk in the centre of the crater, and, if possible, sufficient depth will be reached to demonstrate whether or not there are parts of the supposed foreign body buried several hundred feet beneath the central plain.

The San Francisco Earthquake and Fire.—Months will elapse before the earthquake which destroyed a large part of San Francisco on the morning of April 18 can be described in a satisfactory manner, but a brief statement of the event, and of the fire that followed it, may be made here in advance of the results of the investigations now in progress. These results will finally make it possible to publish the facts of special scientific interest.

The quick succession of severe earth movements that caused the destruction occurred about 5.15 A. M., and appears to have continued less than a half minute. The movement was apparently from south to north. Nearly all buildings were violently wrenched, and many of the frailer ones fell in ruins. Modern business buildings with steel frames stood the shock well, and remained practically intact in the vital points of their construction, though their facing of stone, to a greater or less extent, was toppled into the street. The satisfactory result of this very severe test of the efficacy of steel framework in large buildings will probably increase its use in cities where earthquake phenomena are common. Such architectural features as cornices suffered very severely, and many streets were blocked by débris. The loss of life appears to have been less than 300.

Seismographs reported the shock the world around. Many of the outlying towns in California suffered severely. The area within which the disturbance was sensibly felt, however, seems to have been much smaller than that which was within the range of the Charleston earthquake of 1886.

As is usual, fire followed closely after the shock. The water system was completely crippled, and there was no water to fight the flames. Beginning after the work of the earthquake, the fire did not completely burn itself out till April 23, five days after the shock. Approximately, seven square miles were burnt over, including the entire business district. The walls and steel framework of many buildings are still standing. In the course of a few days nearly 200,000 persons were able to leave the city to find temporary homes elsewhere. About the same number remained in the city, and the whole country participated in the effort to organize relief and get it to the sufferers as quickly as possible.

THE GEOLOGICAL SURVEY OF GEORGIA IN 1905.—At the beginning of the year, the large exhibit of the mineral resources of Georgia made by the State, through its Geological Survey, at the Louisiana Purchase Exposition in St. Louis, was returned to the Capitol and installed in the State Museum. W. S. Yeates, State Geologist, was largely engaged with administrative work. In field work, one of the assistant geologists completed a study of the contact between the Cretaceous and Tertiary formations along the line from Columbus to Macon and Augusta, preparatory to the completion of a preliminary map of the geology of Georgia. He was also engaged in field work on the iron ores of Georgia, so as to complete a second report on the iron ores of the State, to be published as *Bulletin* No. 10-B.

The edition of *Bulletin* No. 1, on the marbles of Georgia, having been exhausted, and there being continued demand for this report, additional data were procured in the field and a new edition, revised and enlarged, is now going through the press. The other Assistant Geologist began field work for a second report on the clays of Georgia, to be published when completed, as *Bulletin* No. 6-B. There are now in press *Bulletin* No. 13, on the ochre deposits; *Bulletin* No. 14, on the manganese deposits; *Bulletin* No. 15, on the underground waters of Georgia. A long report on the water-powers of Georgia has been submitted to the State Geologist by one of his assistants, and will be published as *Bulletin* No. 3-B.

HIGHEST MOUNTAINS IN THE UNITED STATES.—The fourth edition of the United States Dictionary of Altitudes gives new determinations of the heights of Mounts Whitney and Rainier. The elevation assigned to Mount Whitney is 14,502 feet, while in the third edition it was 14,898 feet (BULLETIN, 1905, p. 734). Mount Rainier's height is given as 14,363 feet, the earlier figures having been 14,526 feet. Mount Whitney leads in elevation among our mountains south of Canada, but Mount Williamson in California, according to the Dictionary, is only two feet lower. Colorado has twenty-seven mountains over 14,000 feet in height, very few of which are known by names to the general public excepting Pike's Peak, Holy Cross Mountain, and others which, owing to accessibility, history, or outlook, have especially attracted attention. Elbert Peak, 14,421 feet, is the culminating summit in Colorado. California has eleven mountains over 14,000 feet high. Eight of Alaska's summits rise above 15,000 feet, with Mount McKinley, 20,464 feet, and St. Elias, 18,024 feet, in the lead.

THE HUDSON BAY ROUTE.—Mr. A. P. Low, the newly-appointed director of the Geological Survey of Canada, addressing the Canadian Club at Montreal, declared that Hudson Bay and Hudson Strait were navigable for ordinary vessels for four clear months in the year—from July 15 to November 15. The distance from the Canadian wheat-belt to Fort Churchill was, he said, less than the distance to the head of navigation on the Great Lakes, while from Fort

Churchill to Liverpool the distance was the same as from Quebec to Liverpool. Therefore the shipping of grain from the North-West to Great Britain by the Hudson Bay route would save the heavy cost of transport from the Great Lakes to Quebec. Mr. Low expressed his conviction that this route would be utilized in the near future.

THE ROCKY MOUNTAINS PARK OF CANADA.—The *Report* for 1905 of Superintendent Douglas, of the Rocky Mountains Park of Canada, shows that considerable additions were made to the roads and bridle trails, opening new points from which to view the splendid scenery of this great national park. About 5,000 tourists were turned away from Banff last season for lack of accommodations. The hotels are excellent, and a number of them are being enlarged to meet the increasing demands of the tourist season. The discovery of the Deutschman caves, about six miles from Glacier House, apparently adds a new attraction to the great playground. About four-fifths of a mile of passageways have thus far been surveyed in the Cañon, the main cave, the descent into which was made last year by a rope down a nearly perpendicular incline. The average height of the main passage is about 100 feet, with a width of from 8 to 20 feet. The cave was formed by water-erosion in very hard crystalline limestone consisting of alternate bands of white mottled and grey marble. A carbonate-of-lime coating on the walls forms its decoration. It is estimated that the erosion of this cave required a period of nearly 40,000 years. Only a part of the cave has yet been explored, and a great deal of work must be done before this and other caverns in the group are made accessible to the general public.

EARTHQUAKE IN SOUTH AMERICA.—On the last day of January the western coast of Colombia and adjacent portions of Ecuador were the scene of intense seismic activity. Scientific details have not been received, but it is known that the shock was first felt in the province of Esmeraldas, Ecuador, at 10 A. M., and the disturbance was frequently repeated until Feb. 6, the inhabitants living in a state of panic and abandoning their houses for the open air. The epicentral tract was apparently the sea-floor some distance from the land. Waves caused by the shocks swept in, flooding the principal streets of Esmeraldas, while Tumaco, a small Colombian island, was overwhelmed, many persons being drowned. Near Port Limones four small islands are said to have disappeared, though the fishermen there had time to escape in their boats. Various buildings in Esmeraldas were overthrown and many Colombian towns were severely shaken, the damage and loss of life being apparently greatest at Mosquera, San Juan, and Domingo Ortiz, while Antioquia and other departments suffered severely.

Professor John Milne reports that he obtained an excellent series of seismograms at his observatory on the English coast, indicating an unusually large collapse. He says (*Geog. Jour.*, April, 1906) that in the history of seismic disturbance in this region it is remarkable how often convulsions in the Cordillera have found a response in the West Indies. To go no further back than 1902, the great disaster at St. Pierre had been preceded by severe disturbances in Guatemala. A record of cable fractures off the west coast of South America shows that the portion of the sea-floor off the mouth of the Esmeraldas River has been particularly liable to changes of contour.

GEOGRAPHICAL DICTIONARY OF THE DEPARTMENT OF CHUQUISACA, BOLIVIA.—The Geographical Society of Sucre has issued a gazetteer of this political sub-

division of Bolivia in which Sucre is situated. The *Diccionario de Chuquisaca* contains 372 pp., well printed, with the names arranged in alphabetical order and the geographical, historical, and statistical data relating to each topic. The introduction gives a summary of the orography and hydrography of the Department, the physical geography is further treated under the name of each canton, and the environs of each of the larger towns are described in detail. The range of geographical topics is wide enough to include the haciendas or landed estates.

ARGENTINE SCIENTIFIC STATIONS IN THE FAR SOUTH.—A cable despatch from Buenos Aires says that the Argentine Government has purchased the polar ship of the Charcot Expedition, renamed it *Le Français*, and will utilize the vessel to keep up communications with the meteorological and magnetic station founded by Mr. Bruce in the South Orkneys. The Government intends to establish an Antarctic scientific station on Wandel Island, Charcot's winter quarters.

ASIA.

THE KANGRA EARTHQUAKE OF APRIL 4, 1905.—The *General Report* of the Geological Survey of India for 1905 (*Records*, Vol. XXXIII, Part 2, 1906) contains a review of the destructive earthquake that devastated the Kangra valley last year, among the foothills of the Himalayas in the eastern part of the Punjab. For the more critical study of the effects, four officers of the Geological Survey were detailed to the affected areas. The destruction of life in the epicentral tract was enormous, as the earthquake began with little warning at an early hour, when most persons were still asleep. Almost all the buildings in the Kangra area were destroyed, there was great damage and considerable loss of life in the hilly tracts of Mandi State and Kulu, serious damage in Dehra Dún, Mussoorie, Chakráta, and other towns, and slight damage in the large towns of Lahore, Amritsar, Jullundur, Saháranpur, and others similarly placed with reference to the centre of disturbance. Far outside these regions the effects were felt with constantly-diminishing intensity, until the limits of its appreciation by the unaided senses coincided roughly with part of an ellipse passing through Quetta, Surat, Ellichpur, False Point, and Lákhimpur. This curve, if continued, would pass into the little-known regions of the higher Himalaya and Tibet. It is believed that the total area affected was about 1,625,000 square miles. The earthquake was therefore a notable one in seismological history; and as 20,000 persons are estimated to have perished by it, it was one of the most disastrous of modern times.

These points were noticed with regard to the surface effects. All the surface valley deposits (alluvium, etc.) were proportionately more shaken than the solid rock; the soft Tertiary sandstones were thrown into more destructive vibrations than the older and more compacted strata; narrow ridges with free ends (spurs) were very much more shaken than broad areas and the flat hollows between the spurs; the more distant vibrations and tremors were weakly felt in alluvium, in the flat-lying Vindhyans and the Deccan trap, while no results were reported from the ancient and steeply-dipping Aravalis, and this area was similarly barren of results in the earthquake of 1897. The earth-waves travelled to Japan at the rate of 2.05 miles a second. There were two foci of the disturbance. The main focus was in the Kangra area parallel with the folded Tertiary rocks, and its depth was about 18 to 30 miles. The subsidiary focus was parallel to the first under the Tertiary mass in the Dehra Dún area.

DR. SVEN HEDIN'S JOURNEY THROUGH PERSIA.—A telegram from Teheran, dated April 10, announced the arrival of Dr. Sven Hedin in Seistan on the previous day after an extremely interesting journey by Jandak, Turoot, Khur, Tabbas, Naiband, and Neh, in the course of which he crossed the Dasht-i-Kavir, the great salt desert, three times. The explorer said he was in splendid health, and had collected material for a work on eastern Persia. He had made a map of 162 sheets, had taken hundreds of photographs and sketches, and had formed a geological collection. He was to leave for Nushki on April 12.

EXPLORATIONS IN THE TARIM BASIN.—According to the Paris correspondent of the London *Times*, the Paris Société de Géographie has entrusted to Mr. Peliot, a young French Professor of the Chinese language, a scientific mission which will comprise explorations in the country north of Tibet where Sven Hedin, Stein, and others have found ruins bearing witness to a flourishing ancient civilization. The Société has supplied about 200,000 francs to be used in his work.

A 300-YEAR CLIMATIC CYCLE IN CHINA.—In a recent number of *Nature* (Vol. 73, 1906, 413-414) a correspondent in Shanghai, Mr. T. W. Kingsmill, points out that a study of droughts in China reveals a periodicity of about 300 years. This period has lately been discussed by Mr. H. W. Clough in the *Astrophysical Journal*, who arrives at the conclusion that a 300-year cycle exists in solar and in allied terrestrial phenomena. Mr. Kingsmill notes that the climatic cycle of about thirty-four years (Brückner) seems to agree with three sun-spot cycles, while the longer period of 299¼ years seems to correspond with twenty-seven sun-spot cycles. R. DEC. W.

AUSTRALASIA.

RAINFALL MAP OF NEW SOUTH WALES.—The Sydney, New South Wales, Observatory has published a mean annual rainfall map of the colony. At each station the mean annual rainfall is down in inches and hundredths, and, in addition, the usual isohyetal lines are drawn for every five inches. The annual means are computed from all yearly records available, covering generally from twenty to forty years. There is, therefore, no reduction to the same period of time; but although the map is doubtless to some extent misleading on that account, the larger facts are shown with sufficient accuracy for ordinary purposes.
R. DEC. W.

SNOWSTORM OF AUGUST, 1905, IN NEW SOUTH WALES.—The Observatory at Sydney, New South Wales, has published an interesting chart showing the extent of a snowstorm on August 29th and 30th, 1905. Every station at which snow fell is indicated by a small circle. This snowfall, as is pointed out by Mr. Henry A. Hunt, Acting Meteorologist of the Sydney Observatory, was somewhat remarkable, in that it reached a very low latitude late in the season. In the English translation of Hann's *Handbuch der Klimatologie*, Vol. I, p. 314, the equatorial limit of occasional snowfall in Australia is given as latitude 34° S., and on page 313 the statement is made that snow has fallen once at Sydney. In the snowstorm of August 29th and 30th last, snow is noted as having occurred at Hanover, in latitude about 29.1° S. R. DEC. W.

EUROPE.

THE MARSEILLES EXHIBITION.—The oceanographical exhibition which has been in preparation for some time at Marseilles will be opened to the public between

April and October. The exhibits will especially illustrate the results of deep-sea exploration and of the recent researches in the polar regions. All matters connected with the scientific study of the sea and its fisheries will be shown. The exhibition will have an international character, and the co-operation of the leading oceanographers of all nations was invited. The principal institutions in Great Britain connected with the study of oceanography and marine biology organized a Committee under the presidency of Sir John Murray, and a representative British exhibit has been sent to Marseilles. The polar exploring vessel *Scotia* will be on exhibition, and also a model of Captain Scott's ship *Discovery*. In September the French Colonial Congress will be held in connection with the exhibition, and a Congress of geographical societies will also be arranged under the presidency of M. le Myre de Vilers, President of the Paris Société de Géographie.

Rainfall of England and Southeast Trade Velocity.—Dr. W. N. Shaw, Director of the British Meteorological Service, has made a study of the connection between English rainfall and the velocity of the southeast trade at St. Helena (*Nature*, Dec. 21, 1905). In these days, when more and more evidence is accumulating of a correlation between the variations of one meteorological element in one region and the variations of quite another meteorological element in a very different region, one is not surprised at the results of Dr. Shaw's investigation; but the conclusions are wholly new, and very interesting. The year 1903 was one of exceptionally high trade-wind velocity; it was also a year of heavy rainfall in England. The year 1893 was one of drought in England; it was one of very low wind velocities at St. Helena. When the monthly values of wind velocity at St. Helena for the whole period are plotted (1892-1903), and together with these the seasonal rainfall in the south of England, there is a remarkable similarity in the curves. In 1898 there were two maxima of wind velocity, instead of the usual one maximum, and the rainfall of southern England also showed two maxima; the first, in May, two months after the unusual second maximum of wind velocity at St. Helena; the second in November, a month later than usual, and the second maximum of wind velocity at St. Helena was also a month later than usual. The evidence in favour of a connection between St. Helena trade-wind velocities and south England rainfalls can, Dr. Shaw believes, "hardly be pure coincidence." R. DeC. W.

A Comparative Study of Scottish and Danish Lakes.—Dr. Wesenberg-Lund of the Danish Fresh-water Biological Station was invited in 1904 by Sir John Murray to spend a few weeks in exploring the Scottish lakes, in order to make a comparison between them and the Danish lakes. In other words, he desired to compare the lakes of a highland with those of a lowland country. He has written a paper on the results of these studies (*Proc.* of Roy. Soc. of Edinburgh, Vol. XXV, Part I, pp. 401-48, with four plates). The following are some of his conclusions as to the physical characteristics of the lakes:

> The foregoing remarks refer only to the character of the Danish and Scottish lakes, but I feel convinced that many of the facts stated are common to lakes belonging respectively to the great Central European plain and to alpine countries. As traits common to all the first-mentioned lakes, I would specially point to their shallowness, their gently sloping shores, their roundish outline, the high temperature of the surface water in summer and the freezing over in winter, the ice-erosion on the shores, the small transparency, and the yellow or yellow-green colour of the water in summer, due to the huge plankton-masses. Differences may be looked for with regard to the chemical composition of the water and bottom-mud, owing to the varying chemical compositions of the soil in different countries; I anticipate that further investigations will prove that the large amount of lime carried by streams into

our lakes is one of the most characteristic peculiarities of the Danish lakes. On the other hand, I am of opinion that the features mentioned in connection with the Scottish lakes are common to alpine lakes in general. Especially would I call attention to their great depth and long and narrow form, their precipitous shores, the sudden flooding of the rivers and the rapid changes in the level of the lakes, and the slight amplitude in the annual variation of the surface temperature. Peculiar to the Scottish lakes are the small transparency and yellowish-brown colour of the water, to which may undoubtedly be added the large amount of humic acid. These peculiarities may be traced to and are closely connected with the strongly climatological and geological conditions common to the whole country.

(A Comparative Study of the Lakes of Scotland and Denmark. By Dr. C. Wesenberg-Lund of the Danish Fresh-water Biological Station, Communicated by Sir John Murray. Proceedings of the Royal Society of Edinburgh, Vol. XXV, Part 1, p. 411.)

CLIMATE OF THE FAROE ISLANDS.—The Faroe Islands lie in the course of the Gulf Stream and but a short distance from the edge of the cold polar current which sweeps around the east coast of Iceland. Hence the climate is variable and uncertain, although the ranges are small. The summers are cool and the winters mild. At Thorshavn the January mean is given as 37.8°, and the July mean as 51.4°. In twenty-five years the absolute extremes were 11.1° and 70.1°. Fog is most common in summer. Clear days are always rare. If a clear day is taken as one with not more than one-fifth of the sky cloudy, there are at Thorshavn, on the average, only six clear days a year. Most of the rainfall comes in autumn and winter, as usual in a marine régime of rainfall. Snow rarely lies more than a week or so near the shore. In some localities it may gather on the slopes and cause avalanches.—(*Scot. Geogr. Mag.*, XXII, 1906, 63.)

R. DEC. W.

ALPINE MUSEUM IN BERN.—The Alpine Museum which was opened in Bern last year has among its exhibits the superior relief models of the Swiss Alps by Professor Heim and engineer Simon and the finest specimens of Swiss Alpine cartography, as the great Dufour maps and the modern relief maps. Many exhibits illustrate the Alpine fauna and flora, methods of rescue in accidents, models of club huts, geological specimens, the development of the mountaineering outfit, Alpine pictorial art, etc. The Museum is under the direction of a Commission, and it will publish "Wissenschaftliche Mitteilungen," of which the first number, "Das Alpine Rettungswesen der Schweiz," by Dr. W. Kürsteiner, has appeared.

THE CINEMATOGRAPH IN EXPLORATION.—Ethnological expeditions are beginning to use the cinematograph, and are finding it a very helpful appliance. The Seligmann Expedition, which recently returned from British New Guinea, brought photographic representations not only of the natives posed in groups but also of the natives in movement. These moving pictures show native dances and other phases of recreations, ceremonies, and occupations. Dr. A. C. Haddon, commenting on Dr. Seligmann's illustrated lecture before the Royal Geographical Society, said that he had seen many of these dances, and it was extremely interesting to him to see them again on the screen, but he missed the colour, the noise, and the excitement which accompany them. The hope was expressed that scientific societies would encourage the use of this method of depicting life among savage peoples.

THE NINTH INTERNATIONAL GEOGRAPHICAL CONGRESS.—The Committee on Organization appointed by the Geographical Society of Geneva has chosen Dr. Arthur de Claparède as President of the Ninth Congress, which will meet in that city July 27—Aug. 6, 1908.

AWARDS OF THE ROYAL GEOGRAPHICAL SOCIETY.—The Council of the Royal Geographical Society has awarded the medals and other honours for 1906 as follows: The Founder's Medal to Mr. Alfred Grandidier for the results of his many years' work on the island of Madagascar; the Patron's Medal to Dr. Robert Bell, who, during forty-five years of field work, mapped a large area of unknown Canada; the Victoria Research Medal to Professor W. M. Ramsay for his studies and field work in ancient geography during nearly thirty years; the Murchison Award to Major H. R. Davis for his explorations in the Shan States, Kachin Hills, Yunnan, Siam, and Sechuan; the Gill Memorial to Major A. St. Hill Gibbons for his exploring and survey work in Barotseland on his two expeditions of 1895-96 and 1898-1900; the Cuthbert Peek Fund to Major H. H. Austin for explorations in the Lake Rudolf and Sobat regions and other work; and the Back Bequest to Major R. G. T. Bright for his eight years of explorations in the Sudan, Uganda, and East Africa.

THE SIMPLON TUNNEL.—The Simplon Tunnel will be opened to public traffic on June 1 next. The first passenger train went through the tunnel on the 25th of January. It consisted of a locomotive and four cars. Entering the tunnel at Brig at 8.46 A. M., it reached the station at the south end of the tunnel at 9.33 o'clock.

OCEANOGRAPHY.

THE PRINCE OF MONACO'S CAMPAIGN LAST YEAR.—Prince Albert of Monaco has printed a brief report on the seventh scientific campaign of the *Princesse Alice* (*Comptes rendus de l'Académie des Sciences,* March 12, 1906; reprinted as *Bulletin* 69 of the Musée Océanographique de Monaco). His voyage was to the Sargasso Sea in the mid-Atlantic, the chief purposes being to study the deep-sea fauna and that of the Sargasso Sea and the meteorology of the upper air. One hundred and eighteen soundings were made to a depth of 5,580 meters, and many specimens of the sea-floor were secured. The vessel returned to Marseilles on September 24, after a voyage of sixty-four days. Most of the report is given to an account of the fauna obtained, which included some rare and new species. The life of the Sargasso Sea was studied at the surface, middle depths, and on the sea-floor at a depth of 3,465 meters. The animal life amid this vegetation is numerous, but not remarkably varied. Specimens of Actinozoa, Ascidiæ, Nudibranchiata, crabs, isopods, fish, and a few other animals were obtained. A tendency to mimicry is particularly noteworthy among the Sargasso fauna. While in this sea five swallows (*Hirundo rustica erythrogaster* Bodd, American variety) visited the vessel, though it was distant nearly 900 miles from the nearest continent. The Prince calls attention to the absence of nearly all animal life at the surface of the sea in all the regions swept by the trade-winds between the Tropic of Cancer, the Azores, and Africa. In this region he has never seen whales or sea-fowl. Flying fish and plankton alone animate this desert. Twenty-six balloons were sent up for meteorological records and thirteen kites, and an altitude of 16,000 meters was attained.

NOTES.

Dr. Fridtjof Nansen, who was appointed Norwegian Minister at London, last November, has been raised to the rank of Ambassador.

Professor Albert P. Brigham, of Colgate University, will conduct a geological course at the summer school of the University of Wisconsin this season.

Miss Ellen C. Semple, of Louisville, will lecture on Anthropology at the University of Chicago during the summer term.

Professor Henry J. Cox, of the U. S. Weather Bureau Service, has been elected President of the Geographic Society of Chicago, to succeed the retiring President, Dr. Paul Goode.

The Geological and Natural History Survey of Wisconsin is publishing a report by Professor U. S. Grant on the lead-and-zinc region of south-western Wisconsin. It contains a general geological map of the region and nine large-scale topographical and as many geological maps of the more important mining areas in the district.

Dr. O. C. Farrington, of the Field Museum of Natural History, is giving a series of lectures on "Meteorites," at Walker Museum, University of Chicago, on Wednesday afternoons in April and May. His subjects are: (1) "History and Astronomical Relations"; (2) "Phenomena of Fall, Size, Shape and Distribution"; (3) "Structure and Classification"; and (4) "Composition and Terrestrial Relations."

Professor T. C. Chamberlin, of the University of Chicago, gave an address on May 11 before the Geographic Society of Chicago on "Secular Changes in Climate."

The Geographical Society of Philadelphia held its annual dinner on April 21. Among the guests of the Society on that occasion were Professor Libbey, Admiral Melville, Dr. Willis L. Moore (Chief of the Weather Bureau), and Mr. Gilbert H. Grosvenor.

Among the French explorers who by decrees of March 9 and 12 were named for decorations in the Legion of Honour were Gautier (Sahara), Le Chatelier (Sahara, Sudan, Congo), De Flotte de Roquevaire (Morocco), L. Gentil (Morocco), Mehier de Mathuisieulx (Tripoli), Rabot (Greenland, Lapland), Lenfant (Niger, Chad), and Superville (Ubangi).

An atlas of European History, containing some forty-eight maps, has been published through Holt & Company.

U. S. Board on Geographic Names. Decisions, April 4, 1906:

Big Pucketa: creek, Allegheny and Westmoreland counties, Penn. (Not Big Pucketta, Paucatoes, Pocatoes, Poketo, Pucketta, Poccatoes, nor Puckety.)

Camp Hagerman: railroad station and town, Warren county, Ohio. (Not Hageman.)

Chatahospee: creeks (Big and Little) tributary from the east to Tallapoosa river, Chambers and Tallapoosa counties, Ala. (Not Chattahospee, Hoolethlocco, Hoolethloces, Hoolethloco, nor Hootethlocco.)

Ellicott City: county seat, Howard county, Md. (Not Ellicott nor Ellicotts Mills.)

Flathead: river, Flathead county, Montana, and in Canada. (Not Flathead River North Fork nor North Fork Flathead.)

Kearny: town, Hudson county, N. J. (Not Kearney.)

Kenai: stream, draining Lake Shilak, Kenai peninsula, into Cook inlet, Alaska. (Not Kaknu.)

Meadow: mountain, Warren town, Knox county, Me. (Not Congress.)

Megunticook: lake, Camden town, Knox county, Me. (Not Canaan nor Lincolnville.)

NORTH AOWA: north branch of stream, Dixon county, Neb. (Not Agoway, Aowa, Ayowa, Iowa, nor Ioway.)

NUTTEN HOOK: village, Columbia county, N. Y. (Not Coxsackie, Newton Hook, nor Nuttenhook.)

* PRINCE GEORGES: county, Md. (Not Prince George nor Prince George's.)

QUEEN ANNE: county, Md. (Not Queen Ann, Queen Anne's, Queen Ann's, nor Queen Anns.)

REIDS GROVE: railroad station and village, Dorchester county, Md. (Not Reed's Grove, Reeds Grove, Reedsgrove, nor Reid's Grove.)

ST. GEORGE ISLAND: election precinct and island, St. Marys county, Md. (Not St. George's Island nor St. Georges Island.)

* ST. MARYS: city, county, and creek, St. Marys county, Md. (Not St. Mary nor St. Mary's.)

SCUPPERNONG: river, Jefferson and Waukesha counties, Wis. (Not Schupernong nor Scupernong.)

* TENANTS HARBOR: lighthouse and village, Knox county, Me. (Not Tenant's Harbor, Tennant Harbor, nor Tennant's Harbor.)

COLORADO.

BISON MOUNTAIN: Tarryall mountains, Park county.

BLACK MOUNTAIN: Park county. (Not Basaltic.)

BUFFALO PEAK: Tarryall mountains, Park county. (Not Freemans.)

CATHEDRAL PEAKS: West Elk mountains, Gunnison county. (Not Mendicant ridge.)

CRESTONE PEAKS: Sangre de Cristo range, Saguache county. (Not Three Tetons.)

DEL NORTE PEAK: San Juan mountains, Rio Grande county. (Not Pintada.)

ELECTRIC PEAK: Sangre de Cristo range, Custer county.

GRANITE BUTTE: group of hills, Teller county. (Not Catamount hills.)

GREEN MOUNTAIN: on plains at base of Front range, Jefferson county. (Not Hendricks peak nor Mt. Hendricks.)

GREENHORN MOUNTAIN: Wet mountains, Huerfano county. (Not Cuerno Verde.)

HUNTS PEAK: Sangre de Cristo mountains, on the boundary between Saguache and Fremont counties.

KIT CARSON PEAK: Sangre de Cristo range, Custer and Saguache counties. (Not Frustum.)

MESA MOUNTAIN: Saguache county. (Not Del Norte.)

MOUNTAIN PRINCETON: Sawatch range, Chaffee county. (Not Chalk.)

MOUNT SNEFFELS: San Juan mountains, Ouray county. (Not Mount Blaine.)

MUSIC PASS: Sangre de Cristo range, Custer county.

OHIO PEAK: Elk mountains, Gunnison county. (Not Anthracite.)

OUTRAY PEAK: Sawatch range, Chaffee county. (Not Hump mountain, Mount Ouray, nor Ouray mount.)

PURPLE MOUNTAIN: Elk mountains, Gunnison county.

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* Reversal of former decision.

SADDLE MOUNTAIN: Park county. (Not Quadrate.)

SHAVANO PEAK: Sawatch mountains, Chaffee county. (Not Mount Shavano nor Mount Usher.)

SIERRA BLANCA MOUNTAINS: Sangre de Cristo range, Costilla county. (Not Cerro Blanco.)

SIGNAL BUTTE: Teller county. (Not Cheops pyramid.)

THUNDER BUTTE: Douglas county. (Not Christs.)

TOPAZ MOUNTAIN: Tarryall mountains, Park county. (Not Pyramid.)

TRACHYTE KNOB: Teller county. (Not Iron knoll nor Iron mountain.)

TROUT CREEK PASS: Trout Creek hills, between Chaffee and Park counties. (Not Bath, Summit, nor Trout.)

TURKSHEAD PEAK: Front range, Jefferson county. (Not Turkey Head, Turkeyhead, nor Turks Head.)

VIRGINIA PEAK: Front range, Jefferson county. (Not Craigs.)

President Roosevelt has ordered that there be added to the duties of the United States Board on Geographic Names the duty of determining, changing, and fixing place-names within the United States and insular possessions, and that all names hereafter suggested for any place by any officer or employee of the Government shall be referred to that Board for its consideration and approval before publication. In these matters, as in all cases of disputed nomenclature, the decisions of the Board are to be accepted by the Departments of Government as the standard authority.

AMERICAN GEOGRAPHICAL SOCIETY.—TRANSACTIONS, APRIL, 1906.—A Regular Meeting of the Society was held at Mendelssohn Hall, No. 119 West Fortieth Street, on Tuesday, April 17, 1906, at 8.30 o'clock, P. M.

Mr. Levi Holbrook in the chair. The following persons, recommended by the Council, were elected Fellows:

Ellsworth M. Taylor.
Joseph B. Morrell.
George Oxenbridge Thacher.
Frank B. Taylor.
C. C. Leffingwell.
Fritz B. Talbot.
Alfred Holt Stone.
Herman K. Viele.
James Slater.
Henry B. Tindall.
T. C. Trask.
Frederick Richardson Griffith.
Edward S. Toothe.
Edgar A. Weimar.
Samuel H. Wheeler.
Richard H. Williams.
John Y. Bayliss.
Mahlon A. Winter.
Charles Addams Worrall.

The Chairman then introduced Mr. Howard W. Du Bois, who addressed the Society on A Mining Engineer's Reconnaissance in the Canadian Rocky Mountains. Stereopticon views were shown.

On motion, the Society adjourned.

ERRATA for article on *Glaciers and Glaciation of Yakutat Bay, Alaska,* Vol. XXXVIII, 1906, pp. 145-167:

p. 146, first foot-note, second line, change *desires* to *deserves.*

p. 150, last line, second paragraph, change 14 and 15 to 13 and 14.

The numbers and legends for figures 23 and 24 have been placed under the wrong half-tone. These should be transposed.

On the map, proof of which was not seen by the authors, *Yakutat Country* should read *Yakutat Cemetery*. *Galiado Glacier* should read *Galiano Glacier*.

As originally written, this paper had a section describing a recent remarkable change of level, which occurred in September, 1899. The elevated and depressed shore-lines were indicated, to illustrate this part of the paper, which was not printed. An account of this change of level will appear in a forthcoming number of Volume XVII of the *Bulletin* of the Geological Society of America.

NEW MAPS.

AFRICA.

CONGO FREE STATE.—Mission Scientifique Congo-Nil. Itinéraire Parcouru d'Octobre, 1902, à Avril, 1905. Scale, 1:1,000,000, or 15.7 statute miles to an inch. By Commandant Ch. Lemaire and Lieutenants A. Paulis and A. Caroelli. Issued by the Congo Free State, 1900.

The map gives the route of the Lemaire Expedition between the Congo and the Nile, shows the points whose longitude was determined, and the methods used, together with the villages, camps, mountains, and the altitudes measured.

FRENCH CONGO.—Le Tchad. Aspect général en fin Avril, 1904. Scale, 1:400,000, or 6.3 statute miles to an inch. By Captain J. Tilho, *La Géographie*, No. 3, Paris, 1906.

This very detailed map of the lake is based upon the surveys of six French officers during the French explorations of February-May, 1904. A number of new points were astronomically fixed, and the map is the best yet made of this lake, now far advanced toward desiccation. The scores of sand-banks which have arisen as little islands along the east coast are shown, and there are lines of soundings giving the depth of water in various parts of the lake.

EGYPT.—Carte des Chemins de L'État et des Compagnies agricoles. Scale, 1:400,000, or 6.3 statute miles to an inch. (2 Sheets.) Bureau des Études, Cairo, 1905.

Shows in black the single and double track Government and three private railways and in red the lines of the two companies operating the Delta and Fayum Light Railways. The neighbouring desert routes are indicated. The name of every railroad station from the Mediterranean to Assuan is inserted, and there are insets of Cairo, Alexandria, and their environs on a scale of 1:100,000, or 1.5 statute mile to an inch.

AMERICA.

U. S. GEOLOGICAL SURVEY MAPS.

Geologic Atlas of the United States. Washington, D. C., 1906.

No. 131. Needle Mountain Folio, Colorado. Scale, 1:62,500.

No. 132. Muscogee Folio, Indian Territory. Scale, 1:125,000.

No. 133. Ebensburg Folio, Pennsylvania. Scale 1:62,500.

The 26th annual *Report* of the Director (1904-5) includes the following maps:

Map of Alaska showing progress of Topographic and Geologic Surveys. Scale, 197 statute miles to an inch. Washington, 1905.

Shows the areas of topographical and geological surveys and reconnaissances and of special geological investigations prior to 1904 and the areas of the same kinds of work in 1904.

Map of the United States, showing areas covered by Topographic Surveys and the scale employed for each area. Scale, 230 statute miles to an inch. Washington, D. C., 1905.

This general map shows the condition of the topographical surveys to June 30, 1905.

Plates III-XXIV of this *Report* are maps showing the detailed distribution of the topographic surveys in the various States and Territories. On these plates are shown the sheets published to June 30, 1905, the sheets in course of publication, and the areas surveyed during the field season of 1904 and drawn in map form in the office season of 1904-5. The maps also show the areas in which precise or primary spirit-levels have been run and unmapped areas that are controlled by primary triangulation or traverse or by astronomical positions.

The total area of new surveys was 21,296 square miles. The total area surveyed in the United States to date is 955,996 square miles, or about 32 per cent.

U. S. Hydrographic Office Charts.

Pilot Chart of the North Pacific Ocean, May, 1906.

Pilot Chart of the North Atlantic Ocean, April, 1906.

The reverse of both charts contains brief rules for the use of oil to protect vessels in stormy weather, and also the testimony of many ship captains and others as to the favourable results that have followed the application of oil to calm the seas.

Canada.—Ontario and Keewatin. Rainy River Sheet. (Standard Topographical Map, Sheet 27.) Scale, 1:500,000, or 7.8 statute miles to an inch. James White, Geographer, Dept. of the Interior, Ottawa, 1905.

Shows the projected location of the Grand Trunk Pacific R.R.

Argentina.—Provincia di Córdoba. Scale, 1:2,500,000, or 39.4 statute miles to an inch. Roma, 1905.

Illustrates a report on the province of Cordova and its agricultural colonies in No. 22 of the *Bollettino dell' Emigrazione*. It shows how rapidly railroads have been making large parts of the colony accessible and the many settlements started in this growing agricultural region.

Argentina, Uruguay, and Paraguay.—Eisenbahnkarte der La Plata-Staaten Argentinien, Uruguay u. Paraguay. Scale, 1:3,000,000, or 47.3 statute miles to an inch. Published by the Verein zur Förderung germanischer Einwanderung. Buenos Aires, 1905.

Shows in red all the railroads and the stations along them in the three countries, with insets of the cities of Buenos Aires, Rosario, and Tucuman and their surroundings and the ports of call in southern Argentina.

Chile.—Magallanes-Senos Skyring i Otway i Canales Adyacentes. Scale,

1:250,000, or 3.95 statute miles to an inch. Oficina Hidrográfica, Valparaiso, 1905. (Price, $2.)

The explorations of which this chart is the fine result were made in 1904. As usual on these sheets, not only the soundings but also the altitudes of the bordering lands are very numerous.

CHILE.—Puerto i Entradas de Quellon. Scale, 1:75,000, or 1.18 statute miles to an inch. Oficina Hydrográfica, Valparaiso, 1905. (Price, $1.)

A resurvey of these waters on Chiloe Island.

ASIA.

ASIA MINOR.—Karte von Kleinasien. (In 24 Blatt. Scale, 1:400,000, or 6.3 statute miles to an inch.) By Dr. Richard Kiepert. Sheets BI, Aivalyk; CII, Afiun Karahissar; and AI, Titelblatt. Dietrich Reimer (Ernst Vohsen), Berlin, 1906.

Only four sheets of this important map, which was begun in 1902, are yet to come. Although in the present very imperfect state of the surveys it is impossible to make a fully satisfactory map of this part of the Turkish Empire, Dr. Kiepert has critically used all accessible material; and the large scale enabled him to present the topography with all the detail that our present knowledge justifies. Different symbols for town-marks indicate the population, and there are directions for the pronunciation of place-names. The German equivalents of many Turkish geographical expressions are given.

CHINA.—Postal Working Map. No scale. Inspector-General of Customs and Post. Peking, 1903.

Shows all the principal towns in China, distinguishing between those that are postal and those that are not postal. Symbols indicate the various kinds of postal communications, whether by courier, river boat, or railroad. The towns possessing direct postal facilities form only a small minority of all the towns.

CHINA.—The Shooting Districts lying between Wuhu and Shanghai. Together with a map of the Ningpo country carefully corrected and partly surveyed. Scale, 1:600,000, or 9.5 statute miles to an inch. By H. T. Wade, Shanghai, 1903.

A map of the regions south of the lower Yangtse, intended chiefly for sportsmen, and indicating in black type the districts where good shooting may be obtained. The map also gives much information on the distribution of the cotton, silk, rice, and other industries, and shows the waterways and other means of communication. It is accompanied by a pamphlet giving distances in Chinese li from Shanghai to various points.

EAST INDIES.—Ceylon. Scale, 1:760,320, or 12 statute miles to an inch. Published under the direction of P. D. Warren, Surveyor-General of Ceylon, Colombo, 1906.

Contains some information in addition to that issued by the Survey Department in 1904 (BULLETIN, 1905, p. 57), and is a more refined specimen of map-making. Though on a smaller scale, the facts are more clearly expressed. Colours are used with good taste to show the provinces.

AUSTRALIA.

NEW SOUTH WALES.—Geological Map of the Gerringong District. Scale, 20 chains to an inch. Surveyed by L. F. Harper. Department of Mines and Agriculture, Sydney, 1905.

Illustrates Mr. Harper's Report on the geology of this southern coal field of New South Wales, published in the *Records* of the Geological Survey of that State (Vol. VIII, Part II, 1905).

BOOK NOTICES.

Le Méxique au Début du XXe Siècle, par MM. Le Prince Roland Bonaparte, Léon Bourgeois, Jules Claretie, d'Estournelles De Constant, A. de Foville, Hippolyte Gomot, O. Gréard, Albin Haller, Camille Krantz, Michel Lagrave, Louis De Launay, Paul Leroy-Beaulieu, E. Levasseur, Le Général Niox, Alfred Picard, Elisée Reclus. 2 Tomes, 8vo. Paris, Librairie Ch. Delagrave (1904).

Two stately volumes, handsomely printed in large type, appropriately illustrated by many plans and charts in the text as well as by full-page plates, and a large topographical map of Mexico at the end, present to the public: "Mexico in the Beginning of the Twentieth Century." It is a meritorious effort, and reflects credit on the initiator, Don Sebastian de Mier, on Prince Roland Bonaparte and his collaborators. Not less than sixteen well-known political and scientific writers of France have, each, taken up a subject and treated it in the form of a monograph, while there is sufficient touch between the treatises to maintain logical sequence. Hence the work is divided into sixteen sections, seven of which (Introduction, Geography, Population and Colonization, Political Institutions, Agriculture, Mining, and Industry and Commerce, etc.) are contained in the first, the remaining nine (Railroads, Postal Service and Telegraphs, Coinage and Banks, Finances, Public Instruction, Sciences, Literature and Art, Army and Navy, Foreign Relations) and a Conclusion by Mr. E. Levasseur (who also has furnished the Introduction) form the contents of the second volume.

That the impression created by the present condition of Mexico is a satisfactory one will surprise nobody; nor is it to be wondered at, if the decided progress achieved by the Mexican people within the last twenty years is credited to the administration of General Porfirio Diaz. That progress is also (given the unquestionable merits of the Mexican President and of his advisers) largely due to the stability of direction insured by his maintenance at the head of the State; and it shows how much more beneficial such stability can become than alternate variations in policy brought about by party changes.

To do justice to all the sixteen chapters requires too great a space. We can only glance at some of them, and shall begin with Mr. Levasseur's Introduction. That introduction, as far as the historical part of it is concerned, is open to some critical observations. Thus the assertion that Mitla was destroyed in 1494 is by no means correct. The "Mictlan Quauhtla" of Mexican chronicles was not the ancient settlement of "Lyo-Baa," of the past of which there are as yet no authentic

records. Nor is it apparent that the Mexicans were "from the earliest times on" builders of "lacustrian cities." The picture of the ethnologic status of the ancient Mexicans is also quite an antiquated one. In the same strain and in the spirit of hostility towards Spain resulting from lack of knowledge (of the nature of the Indian as well as of documentary history) the epoch of colonization is treated. It is the usual European standpoint deeply rooted in students of American antiquities and ethnology who, after the fashion of the French *émigrés,* have "neither forgotten nor learnt anything."

It is with some surprise that we meet, in the Aperçu Géographique of so distinguished a geographer as Mr. Elisée Reclus, statements like the following: (p. 42) "The Gila River, that flows from East to West towards the lower Colorado, divides the North-American mountains of Arizona and the Mexican ranges of Sonora and Chihuahua." As far as known, the Sierra Chihui-cahui and parallel chains, of considerable length and elevation, extend, in an approximately north-southerly direction, *between* the Gila and the Mexican boundary line, and they still are within the territory of the United States of *North* America. Nor is the term Sierra Madre applied to these ranges; it is confined to chains south of the frontier of Mexico. The section devoted to Hydrography does not contain palpable mistakes of a geographical nature, only that part of it touching upon the basin (Mr. Reclus justly remarks it is not a valley) of Mexico is disfigured by over-estimate of primitive Indian culture, marring the value of an otherwise very interesting chapter. It is almost comical to read, that the Chief of Tezcuco, "mourning wolf—Nezahual-Coyotl"—was a "very able engineer." The criticism upon Cortés for causing Spanish Mexico to be rebuilt on the site of the former Indian pueblo instead of the "lovely slopes" along the shore of the lake is simply childish. To cap the climax of errors, the famous tree of Santa Maria del Tule in Oaxaca is mentioned as a "sacred tree of the Tzapotecas," whereas it is established that, about 1675, there were four sprouts not over six feet in height growing around a spring, and that the junction of these into one trunk formed, since that date, the present giant. The village where the tree stands is called Santa Maria, not Santa Catarina, as Mr. Reclus (page 80) has it.

The section on Population and Colonization, due to the pen of Prince Roland Bonaparte, bristles with statements influenced by erroneous ideas touching the primitive condition and social organization of the Indians. To call the *Tlatoani,* or members of the tribal council, "feudal and hereditary lords" is only one example out of many. The romance built upon them is elaborately used, in explanation of the formation of "castes," in post-Columbian Mexico. The statement, (p. 89) "Moved by the narrow-minded patriotism and protectionism of the period, the Council of the Indies prohibited forever the access of foreigners to Spanish colonies," is correct, in the sense that such a prohibitory measure was indeed enforced; but it would have been proper to acknowledge that the incessant and unjustifiable aggressions upon Spanish colonies in times of peace, chiefly by the French in the sixteenth century, and later on by the English, compelled the Spanish Government to close its colonies to the subjects of other nations. It was a suicidal measure, but it was called for. We also have to take exception to the phrase (p. 89) that the Spanish immigrants, prompted by a spirit of local clannishness (*esprit de clocher*), were induced to form "a sort of clan." With the introduction of European ideas, the formation of clans was an utter impossibility. The section devoted to the Mexican mestizoes is remarkable for moderation of language concerning the Spaniards and for general truthfulness. The part

dedicated to Indians contains a number of valuable (because true) statements, as, for instance: (p. 101) "It is not the sword of the conquerors that has caused the great losses of the Indian race, but the smallpox and the epidemics carried over from the Old World, chiefly those of 1545 and 1576." It should be observed, however, that the *Matlazahuatl,* which then decimated the population of the Mexican tableland, is an *indigenous* disease, forming a transition from the *vomito* of the coast to the typhus endemic in the Lake basin; it follows that the epidemics mentioned were not imported, but sporadic explosions, such as occur occasionally everywhere, and for which, as yet, no absolute reason has been discovered. Again, it is subject to proof that the number of Indians in Mexico *did not diminish,* but that, on the contrary, it *increased,* under Spanish domination. The settlements have been moved, and the composition of the residents of Indian extraction has changed, under the beneficial influence of *enforced peace,* which the Spaniards maintained between the tribes. Speaking of the Indians of northern Mexico, Prince Bonaparte makes the very just remark: (p. 105) "The misfortune of those poor peoples, as well as those of many others in both Americas, has been that the apostolic career of the Jesuits was interrupted too soon." The attempted justification of the Indian (p. 109) against charges of intemperance and superstition might well have been omitted, although there is a certain amount of (involuntary) truthfulness in it. The clinging of the Indian to his primitive rites is a feature resulting from the pre-Columbian condition, social but especially religious.

While (page 112) we meet with the novel and quite extraordinary statement: "Finally, several *thousand Yaquis* (italics are ours) from Sonora have emigrated to the North-American territory of Arizona, in 1902 and 1903," the chapter on Mormon immigration, on the other hand, is quite remarkable for the exact understanding of Mormon character and designs.

The chapter by Mr. Léon Bourgeois on Political Institutions is interesting for the questions between Church and State. Its author is certainly right in saying that there are Mexican statesmen (politicians would be a more proper term) who already regret the complete separation between Church and State. They probably realize that independence of the former deprives the State and its partisans of profitable control.

We can only recommend the section on Agriculture for its generally moderate tone and the wealth of useful information it imparts. Mr. Hippolyte Gomot proves in it that he has some practical knowledge of the aborigines, who constitute the bulk of Mexican land-tillers, when he says: "As for the aborigine, he destroys without thinking of the future; foresight is not a virtue of the Indian." Some old fables about the customs of primitive Mexico are, of course, repeated, such as that of the "Imperial Menageries," but they do not impair the general usefulness of the chapter. To any one interested in the agricultural resources of Mexico, consultation of Mr. Gomot's contribution is indispensable; and the same may be said of the one on Mines and Mining, by Professor de Launay, of the "École supérieure des Mines" in Paris. Abundant statistics accompany the texts. The first volume closes with Mr. Picard's chapter on Industry, Commerce and Navigation, in which, as an Introduction, the author informs us that the ancient Mexicans knew how to cut precious stones, and similar pleasantries. Casually, Mr. Picard alludes to the introduction of the printing press in 1535; the only mention, be it said, of that important event in the whole book. That introduction is placed, strange to say, to the exclusive credit of the printer, as if it had been his own initiative. We shall return to the subject.

The second volume opens with a most instructive chapter on Railroads and public works in general, by Mr. Camille Krantz. Like all of the other sections devoted to modern Mexican achievements, it is based upon elaborate studies of data.

In his treatise on Coins and Coinage, and on Banking, Mr. de Foville has displayed fair knowledge of an intricate subject. We have but to repeat this in regard to the chapter of Mr. Leroy-Beaulieu on Finances, in which Porfirio Diaz receives proper credit for the admirable manipulations through which his Government re-established the credit of the Mexican people in the markets of the world.

Mr. Gréard would have done well to investigate some matters alluded to by him in the section on Public Instruction. He should have studied what he calls "colleges and special schools for the children of Aztec nobility." He would have found that the *Telpuch Calli,* or Houses of the youth, were places where the young men of all the clans were instructed in the use of weapons and in some songs and folktales. It is quite surprising to find that, in the few paragraphs devoted to early Spanish efforts at education in Mexico, not a word is said about these early efforts having been made exclusively for the aborigines! These schools were established by Franciscans from then Spanish Belgium, among whom Father Pierre Van der Muir (Fray Pedro de Gante) was most conspicuous as teacher. The Indian children were taught to read and write, not only in Spanish, but in their own native idiom. *To extend this primary instruction* as far as possible *the printing-press was introduced.* Of that important measure Mr. Gréard says nothing; nor does he mention (possibly he is not aware of the fact) that it was the Viceroy of New Spain, Don Antonio de Mendoza and the first Archbishop, Don Fray Juan de Zumárraga, who managed to bring about the establishment of the printing firm of Juan Pablos (his name was Cromberger) at Mexico. He remarks (p. 160) that "the missionaries directed their efforts not only to those who were of European origin; they also looked after mestizos and aborigines." He should have said that the primary education introduced a few years after the Conquest *had in view the Indians exclusively,* and that education of Spaniards and half-castes was of later introduction. It would also have been worth while, instead of alluding to one of the pictorial *pater nosters* of Indian make, to mention the numerous catechisms in Indian languages that had been printed at Mexico previous to 1540.

The paper by Mr. Albin Haller on Sciences suffers from analogous inaccuracies, omissions, and misconceptions. Modern names, of mediocre importance, are plentifully scattered through its pages; whereas, with the exception of Hernandez, not one of the authors of the sixteenth century finds grace. It is true they were almost exclusively ecclesiastics. The chapter following, on Art and Literature, presents the same weak points. Nowhere is any mention found of the Indians who, issuing from the Jesuit College of San Pedro and San Pablo, composed long poems in the last quarter of the sixteenth century. Such efforts appear quaint to us now; they are "out of date," according to our point of view; still, they find their place in a review of Mexican literature, as well as the early poetry of any nation in study of its literature. What has been (no matter whether it pleases us or not) helps to explain that which is. In regard to the numerous historical works of an early date, there is a deplorable lack of mention, and for the numerous grammars and vocabularies in Indian languages, which are the basis of most philological and linguistic studies of our age on Mexican idioms, a complete blank is substituted. The chapters closing the work, on the

Army and Navy, on Military Law, Foreign Relations, and the General Conclusion by Mr. Levasseur, relate to present conditions, and can easily be controlled through official documents and modern statistics.

That the chapters are all equally well written is self-evident when we consider the literary standing of their authors. The unique faculty of agreeably alternating the necessarily dry with lucid expositions and explanation, for which French literature is justly renowned, impresses the reader throughout the work. It is greatly to be regretted that it is so frequently marred by lack of knowledge of the past and of practical acquaintance with the country and people. A. F. B.

The Face of the Earth (Das Antlitz der Erde). By Eduard Suess. Translated by Hertha B. C. Sollas under the direction of W. J. Sollas. Vol. I, pp. xii, 604. 4 maps, 2 pl. and 48 text ill. Oxford, Clarendon Press, 1904.

The English-speaking world is to be congratulated upon being furnished with a translation into its own language by a master of geologic science of the classic work of the great Suess, father of modern physiography. Published originally in Germany in 1885, and later in a masterly French translation (1897), the first volume of The Face of the Earth has been familiar for years to the scientific public, and has had profound influence upon scientific thought and research. It would be a work of supererogation at this late date to undertake an exhaustive criticism of Suess's work, but a few words may be said to extend the knowledge of the clearest, the most instructive, and the most fascinating treatise extant upon the origin and history of the surface features of the globe.

The Face of the Earth epitomizes the work done in a century by scores and hundreds of geological observers, and even goes back to the beginnings of tradition, as well as history, in describing or tracing geologically recent changes in the configuration of our planet. Suess's work shows marvellous erudition and wide reading, but withal his statements are so well founded and his thoughts are so clearly and simply expressed that, in the words of another, "each fact becomes an argument, and the problems develop and in part solve themselves under the very eyes of the reader." The mode of presentation of facts and theories which characterizes and illumines The Face of the Earth cannot be considered unique, since it is employed in many treatises on geology and geography; but the master mind is revealed in the manner of applying the method to the earth as a whole, and in so marshalling facts in their proper relations and true proportions as to give a complete conception of the evolution of the globe, without striving to make the phenomena of nature conform to any preconceived or pet theories of the author.

One cannot appreciate the grandeur of Suess's work without knowing something of the preceding generalizations of Leopold von Buch and Élie de Beaumont, the appearance of which excited as much admiration in their day as has that of the work now under consideration in ours. Von Buch's theories have, indeed, been largely abandoned; but he first called attention to the relations between the great lines of volcanic activity and the grand systems of mountains, and he first introduced order into the study of the complex mountains of central Europe.

Geology has also outlived the geometrical earth-system of de Beaumont; but he was the first to show that the age of mountains could be determined, and that they were not all made at one time. Nor must we forget the work of other early masters of geologic science. Lyell added the idea of the permanence of the

action of geologic forces, though he scarcely touched the fundamental questions of mountain-formation. Suess himself, in his preface to the English translation of Das Antlitz der Erde, refers to the proposition advanced by De la Beche in 1846 that "the foldings of the mountains of South Wales correspond to adaptation to a complicated lateral pressure," as being the real foundation and inspiration of his own work. Suess first made known the result of his studies in a little brochure entitled "Die Entstehung der Alpen" (The Origin of the Alps), in which one finds an advance statement of most of the ideas which have been so completely elaborated in his monumental work.

By a masterly array of facts, culled from all sources and thoroughly digested, Suess describes in broad terms in this volume several of the principal mountain-chains of the globe, the chief plateaux, and the mediterranean seas, comparing the features of one continent or province with those of another as critically as the explorations and reports would permit, since, as he says, the history of the earth is of fundamental importance in the description of the earth. He finds no evidence in support of the "elevation crater" theory of von Buch, and he determines the beautifully simple and mathematical geometric lines of de Beaumont to be equally contrary to the facts. All the phenomena show that in the surface of the earth we have to deal with a rigid crust which presents everywhere the results of accommodation to lateral pressure. The trend-lines of mountain-chains are seldom straight. On the contrary, they are, as a rule, curves of accommodation to lateral pressure, and sometimes they are strongly bent. The Alps, for example, yielding to pressure from the northwest, extend in a concave curve toward the Carpathians, avoiding the older Bohemian land-mass.

The last chapter of the volume sums up the comparative studies of the preceding portion of the book. It classifies the continental land-masses, aside from Australasia, which is not discussed for lack of data, into the units of (1) Indo-Africa, (2) Eurasia advancing toward (1) in a series of great folds, (3) South America, and (4) North America. Structurally the elevated land-masses may be separated into four principal groups: (1) the tablelands, or plateaux; (2) the horsts, or mountain areas, which have been left by the slipping down of surrounding portions of the earth's crust, (3) the folds, and (4) the volcanic mountains.

The stresses which result from the contraction of the outer part of the body of the earth are transformed into tangential folding and vertical subsidence. Many regions, like Indo-Africa, have experienced no kind of folding movement for a long time; but they have affected the advance of the great folded ranges, like those of southern Eurasia. Subsidence, or collapse, is to be seen much more widely, since at one time or another it has affected the whole surface of the globe. The mediterranean seas and the largest oceans owe their origin and enlargement to the subsidences, which have collected the waters together and permitted the continents to rise above the level of the sea, rendering possible the existence of animals which breathe by means of lungs.

The English translation by Professor Sollas has followed the original paragraph by paragraph and chapter by chapter, retaining the vivid personal style employed by Suess. Occasionally, indeed, the original has been followed too closely for the purity of the English diction. In fact, the only general adverse criticism that can be made regarding the work is that it is a literal translation and nothing more. The twenty years that have elapsed since the preparation of the original have seen many advances in geologic science, and the results of

many valuable researches have been published, but these have not been referred to in any way in the work under review. When the French version of Das Antlitz der Erde was prepared, the references to important literature were brought up to date, with annotations, greatly enhancing the usefulness of the book. The English translation would have been much more acceptable and valuable had a similar plan been followed; had the meagre illustrations of the original been supplemented, as in the French edition, by some of the many that are available, and had the volume been supplied with an index. Both the German and the French editions lack indexes, however; but Americans, at any rate, dislike to hunt for particular items in such a vast storehouse of facts while waiting for years for the last volume of a series to appear with its general index. The English edition is good in that it has followed the French in putting the notes at the bottom of the pages to which they refer, instead of keeping them together at the end of the chapter, as in the original.

This English edition of Suess is a most welcome addition to the library not only of the geologist, but also of the general student of nature who desires to get a clear, broad conception of the surface of the earth. E. O. H.

A Home Geography of New York City. By Gustave Straubenmüller, District Superintendent of Schools, New York City. 12mo. Boston, Ginn & Co., (1905). (Price, 60 cents.)

This admirable text-book is planned to be given to children for the first book studied in geography. It gives the pupils of the Metropolis a clear, concise, yet comprehensive view of the great city in which they live. Every fact in the book should be known by every resident of the city, and these facts are presented so simply and logically that young children will probably be able to grasp and assimilate the material presented to them.

The book marks advance in the teaching of geography. The maps first studied are not those of the hemispheres, of which children know absolutely nothing, but of the school-room and the school-grounds, the parks, the city streets, with which they are more or less familiar. It is astonishing to find how little even high-school pupils know in regard to the geography of their own cities. There are many children living in New York City who have never seen the elevated railroad or a subway station. Many of these children will spend their lives within the limits of New York; and if this book is properly taught, it will undoubtedly be a valuable part of their public-school education.

The book is divided into two parts. The first part deals with Local Geography, and the second part gives Stories of Local History. The stories are so arranged as to lead the child through the paths of historical changes in as logical a manner as possible.

The book opens with exercises on the construction and reading of maps. Beginning with the map of the desk at which the pupil sits, this exercise in scale and proportion is developed through the school-room, the school-house, the school-grounds, the street, the nearest park or square, and finally leads to the reading of maps of various parts of the city. Maps of the city showing relief, physical features, political divisions, the harbor, etc., are given. Bird's-eye views are made a prominent feature, the author regarding them as most helpful devices.

The questions of transportation, manufactures, homes of the people, immigration, ferries, parks, museums, schools, churches, and libraries are considered and briefly discussed. The city government is taken up under the various heads: The

Mayor, the Borough, President, Board of Aldermen, Finance Department, Police Department, Fire Department, etc.

The historical portion of the book begins with the Indian boy and girl as they lived on the island of Manhattan at the time of the coming of the white man. Henry Hudson, Peter Stuyvesant, Nathan Hale, Alexander Hamilton, Robert Fulton, Samuel F. B. Morse, and Peter Cooper are considered with reference to the important work which each accomplished in the development of the city.

The author is to be congratulated upon having prepared a work fitted not only for the pupils of New York but for those of other places; for the plan may be used by teachers in any city. When pupils have thoroughly studied the geography of their home surroundings they will be better prepared to take up the study of other parts of the world.

It would seem wise to add a little more about the plants and animals to be seen in the parks, as subjects of special interest to children, and to include more exercises—that is, definite things to be done by the pupils. There are too few explicit statements in the text for the children, giving some short piece of work to be accomplished at some given time. F. P. G.

The Congo. A Report of the Commission of Enquiry appointed by the Congo Free State Government. iv and 171 pp. G. P. Putnam's Sons, New York, 1906.

This is a careful translation of the Report of the Commission which was appointed to ascertain if the natives in the Congo Free State had been subjected to ill-treatment by private individuals or by State agents, and to make suggestions as to methods of suppressing evils and promoting the welfare of the inhabitants. The Commission says that every possible facility and co-operation was extended to it during the four months of its investigations between Oct. 23, 1904, and Feb. 21, 1905. The conclusions reached and the suggestions submitted to the Congo Government have been briefly described in the press; but no paraphrase can take the place of the Report itself, which in several respects is very notable. The light it throws on the alleged Congo atrocities and the present condition of that territory, its value as a contribution to the literature of colonial government, and its acute and practical suggestions for the betterment of affairs which may have wider application than for the Congo alone, will make this little book a necessity in many libraries. It may be mentioned that the suggestions of the Commission are to be carried out, and that King Leopold appointed a committee to report on the best means of making them effective.

Senga Handbook. A Short Introduction to the Senga Dialect as Spoken on the Lower Luangwa, North-Eastern Rhodesia. By A. C. Madan. 100 pp. The Clarendon Press, Oxford, 1905. (Price, 2s. 6d.)

The Senga are a Bantu people, about 50,000 in number, living partly in British and partly in Portuguese territory on the lower Luangwa river, to the west of Lake Nyassa. This little book deals entirely with the Bantu forms and words used by that part of the tribe living in British territory.

Swahili (Zanzibar) Grammar. By A. C. Madan. 62 pp. The Clarendon Press, Oxford, 1905. (Price, 1s.)

Ki-Swahili is the *lingua-franca* of tropical East Africa, and Dr. Krapf and Bishop Steere years ago made the Swahili grammar accessible to all students.

The purpose of this short treatise is to show that the Swahili grammar is simple and easy to learn, and also that it is a useful introduction to the study of many other Bantu dialects.

Natal. An Illustrated Official Railway Guide and Handbook of General Information. Compiled and edited by C. W. Francis Harrison. xii and 300 pp., 4 Maps, 3 street Plans, many Illustrations, and Index. Payne Jennings, London, 1903.

Natal is one of the regions that have not yet been too much written about or over-photographed. There is, accordingly, much novelty for most readers in this volume which is both a guidebook to the country for the use of tourists and also a work of reference filled with information of a wide range. Few books are so profusely illustrated, and many of the views are very fine and do full justice to the beautiful scenery of Natal, its various activities, its inhabitants, and places of historic interest.

The Uncompahgre Valley and the Gunnison Tunnel. By Barton W. Marsh. 151 pp., Illustrations. Marsh & Torrence, Montrose, 1905. (Price, 65 cents.)

A description of this valley, hemmed in by mountains, in the extreme south-western part of Colorado. It contains about 185,000 acres of irrigable land, and the small area that has yet been reclaimed proves to be remarkably fertile. The Gunnison tunnel and the subsidiary tunnels now building will undoubtedly help, in a short time, to turn the entire valley into a very fruitful region. The book was written to give information about this promising district, is attractively illustrated with half-tones, but, unfortunately, has no map.

Dictionary of Indian Biography. By C. E. Buckland. xii and 494 pp. Bibliography. Swan Sonnenschein & Co., London, 1906.

A volume of moderate size containing the chief facts concerning the lives of about 2,600 persons, living or dead, who have been conspicuous in the history of India within the past 150 years. Such a compilation, small in cost, cannot fail to be very useful wherever the public or press give any attention to the affairs of India. There is no similar work that is moderate in size and cost. Some omissions, especially among the Indian names, should be supplied in the next edition. The Swami Vivekananda, for example, has an adequate notice, but there is none of Ramakrishna, the founder of the Vedanta Philosophy, and of whom Vivekananda was a disciple.

New India, or India in Transition. By Sir Henry John Stedman Cotton. New and Revised Edition. ix and 252 pp., Appendix. Kegan Paul, Trench, Trübner & Co., London, 1905. (Price, 3s. 6d.)

This book is not geographical, but expresses the views of a gentleman who has spent many years in the Indian service as to the political, social, and religious changes that are taking place in India and the spirit which, in the author's opinion, should inspire British policy in relation to them. He discusses the opinions and aspirations of the natives, the increasing bitterness of race feeling, land and economic problems, social, moral, and religious tendencies, and other questions. He says that the gulf which separates the British from the Indians is widening, that the natives are practically excluded from participation in the

higher official, industrial, and commercial life of their country, and that they demand a voice in the government of their own country and opportunities to engage in the public service. On the whole, the book is a criticism of the Anglo-Indian policy of governing India and of the attitude of the Anglo-Indian community towards the native peoples.

Sur le Yang-Tse. Journal d'une double exploration pendant la campagne de Chine (1900–1901). Par Félix Hémon. xv and 346 pp., Maps, Illustrations, and Index. Librairie Ch. Delagrave, Paris, 1904.

This book is interesting not only for its intrinsic merit, but also for the unusual manner of its preparation. The larger part of it is the work of a brilliant young Frenchman who was in the French Marine service and died at the age of 27, soon after his return from China. His diary and correspondence while in China contained a great deal of almost impersonal description of what he saw. It was freshly written with literary grace and in a vivid manner, and, on the whole, was very accurate. It was decided that this material was well worth publishing, and it is comprised in this volume, together with supplementary material of importance contributed by a few of Mr. Hémon's associates in the China campaign. These pen-pictures relate to the characteristics of the Chinese, their family and social life, their religion and education, besides other weighty matters, as well as lively descriptions of things seen on journeys up the Yang-tse and between Shanghai and Peking. The volume concludes with an historical and geographical bibliography of the Yang-tse region.

A Travers Sumatra. Par Fernand Bernard. 223 pp. and 52 illustrations from photographs. Librairie Hachette, Paris, 1904. (Price, 4 fr.)

The journey was from Batavia to Atjeh by boat, landing at ports on the southwest and northeast coasts of Sumatra. The crossing was from Padang to the Straits of Malacca, about midway of the island. The book is a series of pen-pictures along the Sumatran coast and through this middle of the island. The steamer from Batavia passed by Krakatau. Time and nature have repaired the wounds inflicted twenty-three years ago, when half the volcano was blown into the air. Vegetation, more abundant than ever, covers the sides of the great ruin of that day, native villages again cluster around the foot of the mountain among the cocoanut trees. The author saw and photographed from the summit the smoking crater of Merapi in the middle of Sumatra. He spent some time in the Atjeh country, where the long resistance of the natives to the Dutch rule has kept about a fourth of the island unexplored. In 1904 the pacification of the country was still far from complete, though Gen. Van Heutz had conquered the Atjeh Valley. A very good book as travel books go.

Everyday Life among the Head-Hunters and other Experiences from East to West. By Dorothy Cator. xiv and 212 pp., and 34 Illustrations from Photographs. Longmans, Green & Co., London, 1905. (Price, 5s.)

Mrs. Cator's honeymoon trip was from her home in London to the wilds of Borneo, where her husband was in the Government service. She says she knows nothing about "prehistoric and glacial periods" and "the subject of composed and decomposed porphyrite rocks and metamorphic states is unintelligible gibberish to me"; but she has really lived in some areas both of Borneo and

Africa where no other white woman has ever been, and she writes pleasantly and humorously of out-of-the-common experiences. Mrs. Cator was a woman of refinement living in a primitive sort of way and deprived of many ordinary comforts, and yet she was sunny and sanguine enough to be cheerful under most situations.

The Philippine Experiences of an American Teacher.—A Narrative of Work and Travel in the Philippine Islands. By William B. Freer. xi and 344 pp., 12 Illustrations, Map, and Index. Charles Scribner's Sons, New York, 1906. (Price, $1.50.)

Mr. Freer tells only of what he has seen and a part of which he has been. His narrative has to do with his personal experiences with the natives, from the Igorrote mountaineers of the north to the civilized Bicols of the south of Luzon. He had a large opportunity to study them well; for he was the teacher and adviser of many of them, and was brought into close dealings with them every day. Mr. Freer is evidently a man of sense and tact, and he is of the kind of American teachers who are highly praised by the Philippine Commission for the remarkable influence they have really exerted upon the natives. He shows the Filipino in his desirable traits and in his weakness, and demonstrates what the public schools are doing to fit the people ultimately for a fuller measure of self-government than they now possess. In connection with the fact that the school children are now learning to speak English, it is significant that the Spanish language is in no way their tongue, not more than three or four per cent. of the Filipinos being able to speak it. Each of the fifty or more tribes has its own Malay dialect. The author says the time is now ripe for the general introduction of such industrial instruction as has been given at the Manila trade school, where the instruction includes gardening, agriculture, carpentry, iron work, and housekeeping.

L'Italie Illustrée. Par P. Jousset. 703 pp., 14 coloured maps and plans, 9 black maps, 12 engravings, and 784 photographic reproductions. Librairie Larousse, Paris, 1905 (?). (Price, 22 frs.)

This quarto volume is a beautiful picture-book, and a very heavy one, because photographs fill fully half the space and heavily-sized paper is required to print them well. Both in letterpress and in picture the scenery, the ancient and modern monuments of art and architecture, the activities and the life of the people are graphically presented, although in a purely popular manner. The photographs are of the highest quality, which is all that need be said of the pictorial attractiveness of a volume devoted to Italy. The reproductions of Sella photographs, for example, appear to be fully equal to the originals. The plans of cities and ruins are excellent, but the coloured maps are not quite worthy of the encomium passed upon them in the preface. They are based upon detailed topographic surveys, and their scale is large enough for a true and fine generalization of the surface forms, but the work is much inferior to good atlas sheet standards.

The New Zealand Official Year-Book, 1905. By E. J. von Dadelszen. vi and 771 pp., Maps, Diagrams, Appendix, and Index. John Mackay, Government Printer, Wellington, 1905.

Gives in compact and well-arranged form a vast amount of information

about the colony in so many of its aspects that nearly every one, from the merchant and mariner to the tourist and health-seeker, is likely to find in these official pages what he desires to learn about New Zealand. Here is a suggestive statement relating to the Maori:

> So long as the Maori kept to their originally-known colours—black, white and red—in the ornamentation of their houses and clothing the effect was harmonious and pleasing, but when they obtained European paints, dyes and coloured fabrics they were guilty of combinations of colour offensive to the cultivated eye.

Joseph Dombey. Sa Vie, son Œuvre, sa Correspondance. By Dr. E. T. Hamy. cx and 434 pp., Map, and Illustrations. (Librairie Orientale & Americaine.) E. Guilmoto, Paris, 1905. (Price, fr. 7.50.)

Joseph Dombey was a physician of the latter part of the eighteenth century whose attainments in archæology were considerable, though he was above all a naturalist. Turgot sent him to Peru and Chile especially to study their flora, and eight years of his life (1778-1785) were given to this arduous undertaking. Returning to France on the eve of her terrible period of internal political troubles, Dombey became involved in difficulties, and he died while yet he had published practically nothing. Dr. Hamy's book has been printed at the cost of several French societies in order to preserve the results of Dombey's scientific labours, which were found almost entirely in his correspondence. The recital of the main facts of his life and an appreciation of his work fill about one-fifth of the book, and the correspondence occupies the remainder.

Nordamerika. Von Dr. Emil Deckert. Second Edition. xii and 608 pp., 130 Illustrations, 12 Maps, and 21 Tables. Bibliographisches Institut, Leipzig, 1904.

In the first edition of "Allgemeine Länderkunde," the whole of America was treated in one volume no larger than this book, which is devoted to North America alone. This is one of many evidences that it is now more difficult than ever to generalize or summarize in short compass the accumulated information concerning our continent which the numerous scientific bureaux of the United States, Canada, and Mexico are constantly putting into book form. Dr. Decker wrote on North America in the first edition, and now, with twice the space at his command, and with richer materials, his book has a large variety of new contents, though its form and plan are unchanged. In undertaking such a task Dr. Deckert possessed the advantage of having travelled very extensively in North America and with the leisure to study its geographical and other aspects.

As the book treats of all phases of North American geography, none of the numerous topics can be exhaustively handled. What it does is to give a faithful picture of the continent in its most prominent organic and inorganic aspects; and in this we have seen no superior work.

A Book on Essex County, Mass.—Mr. John Henry Sears of Salem, Mass., has just illustrated the fact that there is opportunity for exploration at home. He has written a book "The Physical Geography, Geology, Mineralogy, and Paleontology of Essex County, Massachusetts," which will be of much value to residents of that neighbourhood. It is not often that we have an opportunity to dip into the earth studies with a book before us treating of the subject as far as it relates to our immediate surroundings. This is an advantage that the people of Essex County may now enjoy. They do not need to go outside of their own

county for numerous illustrations of what the author is talking about, and they can form their own opinions as to his accuracy. Everybody in the county who is fond of mineralogical rambles should own this book, for it will guide him to the regions where specimens may best be obtained. There are over 200 half-tone illustrations, which help the text; and the book is one of the best local studies of the kind.

The Gambia Colony and Protectorate. An Official Handbook. By Francis B. Archer. xviii and 364 pp., 4 Maps, 45 Illustrations, and Index. St. Bride's Press, Ltd., London (1905 ?). (Price, 10s.)

A compendium of all manner of information about the colony, including its history from the day of Mungo Park to 1904. It shows the present progress of the people and their country in the various districts, gives an English-Mandingo vocabulary of about 800 words and phrases that are in common use, and presents a large amount of miscellaneous information of importance to all who have much to do with the Colony. The author says it is no longer true that three Governors are required for a West African colony—one dead, another acting, and the third on his way out. While Gambia is not yet an ideal health resort, disease has been fought there with a degree of ever-growing success.

Die Mandschurei. Übersetzt von R. Ullrich. 51 pp. and a Map. Karl Siegismund, Berlin, 1904. (Price, M. 1.)

This book is an admirable epitome of the geography, population, and economic condition of Manchuria at the time it was written. It was translated from the Russian "Material for the Geography of Asia" collected by officers of the Russian General Staff, and, like other works from the same source, it is a good piece of geographical writing. The pamphlet is short, and does not pretend to give anything more than what is necessary for a general knowledge of Manchuria.

Vom Heiligen Berge und aus Makedonien. Von H. Gelzer. xii and 262 pp., 43 Illustrations, Map, and Index. B. G. Teubner, Leipzig, 1904. (Price, M. 6.)

The author visited the Greek convents and a few famous old churches in Albania to study historical and other literary manuscripts of the past centuries which are preserved in these places. He improved the opportunity, also, to inquire into the present state and government of the convents and into the conditions prevailing in Macedonia. The result is a book that is rather out of the common in the material utilized, and gives many interesting facts, especially about the Athos peninsula, in which, in 1902, 7,522 monks of the Greek Church were living, more than half of them Russians, while most of the remainder were Greeks. The photographs help to give a vivid idea of these great religious retreats, and also of various phases of life in Macedonia.

Statistique Annuelle de Géographie Comparée. By Prof. Jean Birot. 32 pp. Hachette & Cie., Paris, 1905.

A well-arranged statistical handbook, in which each kind of facts for the various countries is grouped for purposes of comparison. In the table relating to iron, for example, the quantity, value, and mean price per ton, in certain years, are given for the eight chief producing countries. Another table shows the commercial movement in the principal ports of the world for the years 1901 and

1902. The world statistics, thus grouped, relate to population, the production of goods, fibres, mineral fuel and metals, and to commercial movement and military forces. The comparative idea is kept in view throughout, and the tables are very convenient and suggestive.

Le Rhône. Sa Navigation depuis les Temps anciens jusqu'à nos jours. Par Albert Breittmayer. vi and 105 pp. Henri Georg, Lyons, 1904.

A monograph written with enthusiasm and with descriptions somewhat too extended for foreign readers. The first steamer on the river was *Le Pionnier,* in 1829. It was a wooden boat, and took eighty-eight hours in ascending the river from Arles to Lyons. The six steamboats put into service in the next ten years did a large business both in the freight and passenger trades. The canal joining the Rhine and the Rhone had been opened, and the Rhone had become important in the trade of France, England, Holland, and western Germany as the great highway to Spain, Italy, and the Orient. Then dawned the era of railroads (1842). The navigability of the Rhone had been deteriorating, and little had been done to improve the conditions. The passenger traffic gradually ceased, but of late years the freight trade has shown some improvement.

Science in South Africa.—A Handbook and Review. Prepared under the auspices of the South African Governments and the South African Association for the Advancement of Science. Edited by the Rev. W. Flint, and J. D. F. Gilchrist. x and 505 pp., coloured Plates, Maps, Diagrams, Illustrations, and Index. T. Maskew Miller, Cape Town, 1905.

This Handbook on scientific work and progress in South Africa was prepared for the visit of the British Association in 1905. The two editors were appointed by the Colonial Governments, and the cost of producing the book was defrayed by the colonies. The volume, arranged in eight sections, deals with physical, anthropological, zoological, botanical, geological, mineralogical, economic, educational, and historical problems, and the contributors are actual workers in South Africa. The book shows the present condition of South Africa in respect of scientific research. It was useful to the British Association during its meeting, and will be welcomed by many others; for the scientific literature of South Africa, which has rapidly been increasing, is scattered through many volumes, some of which are difficult of access. This work will serve as an index to the whole subject of South African science.

La Belgique. Institutions, Industrie, Commerce. xx and 870 pp. Maps, and many half-tone Illustrations. J. Goemaere, Government Printer, Brussels, 1905.

This volume was published by the Ministry of Industry and Labor for the purposes of the International Exposition held at Liège last year. It is a summing-up of Belgium to the present time. It describes the kingdom in its geographical, political, and administrative features, systems of education, fine arts, sciences, agriculture, industries, and social organization. Nearly 300 pages are given to the industries and about 100 pages to commerce and communications. The book is profusely illustrated.

The Selkirk Range. By A. O. Wheeler. Vol. I. xvii and 459 pp. Appendices, Illustrations, and Index. Government Printing Bureau, Ottawa, 1905.

Mr. Wheeler and his assistants were engaged for two seasons in making a

topographical survey of the portion of the Selkirk Mountains adjacent to the Canadian Pacific Railway. The ground was covered from the eastern to the western slopes and connected with the topographical survey of the Columbia valley and Arrow lakes. Thus a continuous zone has been surveyed for several miles on both sides of the railway and river, forming a base from which the work may be expanded in any required direction. The survey was especially needed, because the Canadian Alps are every year drawing a larger number of tourists, so that the demand for maps and accurate information is increasing. In the second year of the work the survey was extended southward, to embrace all previous travel and exploration of the higher Selkirk summits and make it possible to supply a reliable guide-map for tourists and mountaineers. Vol. II, containing the maps, diagrams and plates that are the result of this survey, may not be ready for distribution for some months.

The present volume is an official and valuable addition to our information concerning this wonderful mountain-country. It describes the survey and reviews the history of exploration and mountaineering in this region. Among the topics discussed in the appendices are notes on the zoology, ornithology, and botany, by Professor John Macoun; on the climatology, by R. F. Stupart; on the geological structure of the Selkirks, by the late Dr. George M. Dawson; a description of the railway through the range, by H. B. Muckleston; and an account of the discovery of Rogers Pass. The mountain views, photographs of mountaineers, and other illustrations are excellent.

Meteorologie und Klimatologie. Von Dr. Wilhelm Trabert. Large 8vo. Leipzig and Vienna, 1905. pp. 127.

The number of text-books of meteorology is increasing with some rapidity, but climatology has received little attention at the hands of any writer except Dr. Hann, whose *Handbuch der Klimatologie* must remain the authoritative work for years to come. Thus far, no attempt has been made to combine meteorology and climatology in one volume; but Dr. Trabert has undertaken the task, and has done it very successfully. Within the limits of somewhat over one hundred pages he has given an outline of the essential portions of both subjects. The first part is devoted to the meteorological elements, their measurement and reduction. The second, which deals with meteorology proper, presents the distribution of the different elements. The third part, on Weather and Climate, is the most distinctly novel. Beginning with a discussion of weather conditions and maps, and with weather types and forecasts, our author proceeds to give an admirable, albeit very brief, survey of the chief varieties of climate, and of the climates of different parts of the world. With the exception of Hann's famous *Handbuch*, there is no such clear, definite, serviceable treatment as that here given. Moreover, the *Handbuch* is very full; the discussion in Dr. Trabert's book is very brief. Our author makes no attempt to give an exhaustive account of the different climates. He gives for each climatic district a typical example, instead of trying to describe all the conditions in detail. We believe that this volume will meet a want which many teachers have long felt.

R. DEC. W.

OBITUARY.

NATHANIEL S. SHALER.—Professor Shaler died at his home in Cambridge on April 10. He was born in Campbell County, Kentucky, in 1841, and at the age of eighteen was sent to Harvard, where he entered the Lawrence Scientific School. It was not long before his quick, keen, and versatile mind attracted notice. He studied zoology under Louis Agassiz, graduated in 1862, served in the Federal Army for two years and then returned, much broken in health, to Harvard, where he was appointed Instructor in Palæontology, and in 1869 became full Professor. He held this Chair to his death, but its title was changed in 1888 to Geology. He was one of the first American men of science to accept the doctrine of evolution, and Darwinism speedily prevailed at the Peabody Museum after 1873, when Mr. Shaler began to have a free hand there. He became Dean of the Lawrence Scientific School in 1891, and under his direction the school has grown rapidly both in numbers and efficiency. He devoted the last months of his life to the organization of the Graduate School of Applied Science, made possible through the bequest that the late Gordon McKay, at his suggestion, left to Harvard.

Mr. Shaler was a man of remarkable activity and productivity. In Harvard he was known as an able administrator, as a lecturer of unique gifts, and as a friend who kindled the interest, admiration, and affection of the students. His course in geology, known as Natural History 4, was the most popular in Harvard, and in his day it was taken by over 7,000 of the undergraduates. One of his students, now a Professor of Geography, writes to the BULLETIN that "he was tremendously inspiring to all his students, and one of the select among those teachers who can really teach. He was versatile, suggestive, and human, and a gentleman of inborn courtesy." Besides his popular lectures he always conducted one or more advanced courses in palæontology, directed the summer school, carried the growing responsibilities of his deanship, was often busy with investigations and the preparation of reports for the U. S. Geological Survey, served seven years as Director of the Geological Survey of Kentucky and as a member of Massachusetts State Committees on Highways, etc., was consulted as an expert by many mining companies, and still had time to write voluminously and well. His literary products included some 25 or 30 volumes, besides unnumbered articles in magazines and scientific papers.